CITY OF READING, PENNSYLVANIA

PUBLIC WORKS
503 N. 6TH SSTREET
READING, PA 19601
(610) 655-6236

RALPH JOHNSON, P.E.
ACTING PUBLIC WORKS DIRECTOR

January 30, 2014

Certified Mail
Return Receipt Requested

Ms. Margaret L. Hutchinson, Esq.
Assistant United States Attorney
Civil Division Eastern District of Pennsylvania
615 Chestnut Street
Suite 1250
Philadelphia, PA 19106-4476

Re: City of Reading Consent Decree
Calendar Quarterly Progress Report
4th Quarter 2013

Dear Ms. Hutchinson:

In accordance with Section VI Reporting Requirements, Paragraph 41, you will find enclosed the City of Reading's Calendar Quarterly Report. This report documents progress and status on the implementation of Section V Remedial Measures described in Paragraphs 7 through 40. Please feel free to contact me at 610-655-6502 should you have any comments or questions.

Sincerely,

Ralph E. Johnson

Ralph Johnson, PE
Acting Public Works Director

REJ/ts
Enclosure
C: Christopher A. Day, Esq., US EPA
Lisa Trakis, US EPA
Gary Hepford., PA DEP
Shawn Arbaugh, PA DEP
Carole Snyder, Managing Director
Deborah A.S. Hoag, P.E., Utilities Systems Manager
Ralph E. Johnson, P.E., Wasterwater Treatment Manager
Anthony C. Vesay, P.E., Hill International
Keith Mooney, Esq., Legal Counsel
John J. Miravich, Esq., Fox Rothschild
file

City of Reading Consent Decree
Calendar Quarterly Progress Report
Period Ending December 31, 2013

V. REMEDIAL MEASURES

A. General Duties

7. Duty to Comply with Permit – The City's wastewater treatment plant (WWTP) was in compliance with the NPDES permit parameters except for one minor deviation: a fecal coliform laboratory testing error on November 11, 2013 resulted in no result for that date (the test results for fecal coliform for the prior and subsequent days were within the NPDES permit limits)

8. Operation and Maintenance of the Facility – No change. The operation and maintenance ongoing program is implemented.

B. Interim Measures

9. Interim Compliance – Environmental Management System

(d) Pretreatment Data Management System – Continuing progress. The City continues the use of a commercial pretreatment database as well as an abbreviated spreadsheet for simplicity and verification.

10. Interim Plant Influent Monitoring – No change. The plant influent monitoring ongoing program is implemented.

11. Interim Trickling Filter Performance Measures

(a) Performance Improvements – No change. The trickling filter performance measures ongoing program is implemented.

12. Process Control Testing – No change. The process control testing ongoing program is implemented.

13. Dangerous Gas Detection – No change. The gas detection ongoing program is implemented.

14. Certified Plant Operators – No change. The ongoing 24/7 qualified supervisor coverage is implemented.

15. Operations and Maintenance Plan – No change. The operations and maintenance plan remains in place and is annually reviewed and updated as appropriate.

16. Staffing Plan – No change. The ongoing 24/7 supervisor coverage is implemented. The ongoing communication process is implemented.

17. Interim Wet Weather Operational Strategy – No change. Please see the wet weather operation plan.

C. Long Term Evaluation and Construction Schedule – In addition to the Wastewater Treatment Plant this remedial measure reporting includes activities associated with pump stations, force mains and Act 537 Special Study planning.

The 42" flow-meter replacement project is complete.

Construction for the new 42" force main from the 6th and Canal Pump Station to the WWTP is complete and operational. Additional work on the existing 42" force main under the river still exists. Due to its high priority the City requested and the regulators agreed that this project would be considered one of three projects required by Paragraph 28, Rehabilitation of Priority Areas of the Collection System.

The by-passed section of the original 42" force main has been replaced with the ductile iron pipe. According to the information derived from the CCTV analysis, the City's engineer has opined that the original 42" force main under the river is in good condition and ready to operate as a back-up force main. The City is evaluating a proposal for lining the interior of the original 42" force main where it underlies the Schuylkill River for additional reinforcement.

The Sixth and Canal Pump Station (6&CPS) updated reevaluation is complete. We are in the process of preparing an RFP for the phase I work to be done at the station. Due to its high priority the City requested and the regulators agreed that this project be considered one of three projects required by Paragraph 28, Rehabilitation of Priority Areas of the Collection System.

Weston Solutions continues to work on the 6&CPS ground and groundwater contamination studies.

Hazen and Sawyer 19th Ward Pump Station (19WPS) assessment, alternatives evaluation and capital improvements plan is complete. The City will prepare an RFP to procure a design professional for this project. Due to its high priority the City is requesting this project be considered one of three projects forming the completion of paragraph 28, Rehabilitation of Priority Areas of the Collection System.

The Anaerobic Digester Rehabilitation project at the Wastewater Treatment Plant is continuing on schedule. The design is at approximately 60% completion. A change order has been approved, broadening the scope of the project to include the conversion of Digester #5 from secondary to primary digester service. We met with EPA and DEP on November 18, 2013, and discussed this project. Based on that November 18th meeting, it is the City's understanding that the completion of converting Digester #4 for primary digester use will comply with the digester rehabilitation requirement under the Consent Decree (as it will be amended), and that the conversion of Digester #5 is not part of the Consent Decree. There is a $1,000,000 H2O grant available toward this rehabilitation project.

The Improvements to the Fritz Island WWTP project is being designed by Rummel, Klepper & Kahl, LLP (RK&K) of York, PA. Ongoing progress meetings were conducted and RK&K's delivery of the final Basis of Design report (30% design) has been delayed due to a finding that the conceptual design

outlined in the Act 537 Special Study had technical issues that needed to be addressed before progressing to the next stage in the design process. EPA and DEP were both notified of the situation and the City is preparing updates to the Act 537 Special Study and Consent Decree Reports to reflect the refined design. The City and RK&K believe the project will still go out for public bid as previously scheduled. The City is pursuing PennVEST funding and bonds for this project.

18. Treatment Plant Alternatives Submission

(a) Existing Plant Process Evaluation Report – The updated Existing Plant Process Evaluation Report was submitted as part of the Act 537 Plan Special Study.

(b) Evaluation of Treatment Alternatives Report – As stated above there are revisions being prepared to the updated Evaluation of Treatment Alternatives that was submitted as part of the Act 537 Plan Special Study.

19. Capital Improvements Plan – The City has adjusted its 2014 sewer rates based on the Raftelis rate study previously submitted to DOJ, EPA and DEP with the Capital Improvements Plan on June 28, 2013.

It was explained to EPA and DEP during the November 18, 2013, meeting that the Raftelis rate study recommended that the City implement a new City retail sewer fund and rate stabilization fund. The purpose of establishing these new funds is to maintain separation between the sewer rentals paid by City residents from the sewer fees paid by the contributing municipalities to (1) avoid having the City residents bearing a disproportionate share of capital costs, (2) mitigate spikes in the City's sewer retail rates as the capital projects get funded and (3) fund the City's proportionate share of the Infrastructure Contingency Fund (as required by the new IMA). The retail sewer fund and rate stabilization fund will be fully independent of the City's General Fund and will be used to pay the City's proportionate share of capital and operating costs of the sewer system. No money from these new funds will be subject to transfer to the General Fund. (Please see selected PowerPoint slides attached.)

In connection with its rate study, Raftelis also performed an Affordability Analysis on behalf of the City. According to the Raftelis analysis, it appears that the City's sewer rates may be required to exceed the EPA indicator for percentage of mean household income being attributable to sewer rates in order to complete all of the Consent Decree projects as currently scheduled. Establishing the new funds discussed above will help mitigate some of the impact on sewer rates, but the City proposed to EPA and DEP during the November 18, 2013, meeting that the timing of the implementation of the collection system repairs occur towards the end or after closure of the Consent Decree. As discussed, the $50,000,000 ($10,000,000 annually) was entered on the chart just as a placeholder without any engineering or financial analysis. (Please see affordability analysis attached.)

20. Request for Proposals – As explained above, the City is preparing an RFP to procure a design professional to prepare specifications for the 6th and Canal Pump Station upgrades.

21. Permit Applications and Design – The City's NPDES permit PA0026549 was renewed. Also, the digester project DEP Part II permit application was submitted and is presently under review.

22. Permitting – No report.

23. Construction Completion – No report.

24. Start-Up and Operation – No report.

29. Wet Weather Operation Plan – No change. The ongoing wet weather operation plan is implemented and updated annually.

D. Collection System

25. GIS Mapping System - In progress. See below.

(a) Purpose of GIS System - Not applicable.

(b) GIS Mapping of the Sanitary Sewer Collection System – Certified and continuing. The City transmitted a certification for the functionality of the GIS on June 28, 2013. The City continues to work on improving the accuracy of the information and ensuring the information is kept current as changes are made to the collection system that impact the GIS. During this quarter, the City performed additional elevation reviews of the database separated from one unified database to separate databases and layers for wastewater and stormwater. Woolpert acknowledged that the manhole rim elevations are troublesome which impacts the pipe inverts and slopes. They planned a trip to field investigate these issues early in the first quarter of 2014. The City has been using CCTV and magnetic locating as well as cross-referencing between the design plans, GIS, and aerial imagery to investigate and resolve inconsistencies and questions. Discussions have and will continue to include the continual updating and long-term maintenance of the database.

(c) GIS Mapping of the Storm Water Collection System – Certified and continuing. The City transmitted a certification for the functionality of the GIS on June 28, 2013. The City continues improving the accuracy of the information and ensuring the information is kept current as changes are made to the collection system that impact the GIS. During this quarter, the City performed the same reviews with the storm as discussed above in the sanitary.

26. Sanitary Sewer System Evaluation Program

(a) I/I Analysis by Subsystem

The City continued investigating and updating the mapping required for the coordination of the collection system investigative, modeling, and rehabilitative work.

1. Baseline Flow and Rainfall – In Progress. Flow metering was conducted in 2005 and temporary flow meters were placed in the system again in December 2013. Data collection began mid-December with the first delivery anticipated mid-January.

2. Hydraulic Modeling – In Progress. City Council awarded a contract with Hazen & Sawyer for an enhanced scope of services to include this and other collection system engineering support on

October 14, 2013. The hydraulic model was developed and a dry weather calibration was performed using the 2005 flow data. Further details are in the attached reports.

(b) Sewer System Evaluation Survey – In Progress. The sanitary manhole numbering system is refined continually as field inventory show additional or missing manholes and will continue as the inventory and system investigations progress and into the future. With the new engineering firm engaged, there have been discussion about the redefining of subareas with the newer GIS data used as the base.

The computerized maintenance management system implementation project progressed to go live with full-scale geospatially-oriented tracking of preventive and corrective maintenance as well as repairs. The City and Woolpert worked together on Cityworks software configuration for service requests, work orders, and projects to track personnel, equipment, materials, and contractors. Woolpert made software configuration updates with and provided training, a test environment, and go live support in the fourth quarter. The asset relationship for certain activities is being reviewed where there is not a City asset to associate with the work.

After soliciting and evaluating proposals, the City awarded a contract to Woolpert to inspect and evaluate the sanitary sewer system's intermunicipal connection points and flow meters. Woolpert performed field investigation and observations at the points as determined through the Act 537 planning and intermunicipal agreement mapping processes. An additional field visit is schedule for mid-January.

The connection point locations mapped by SSM Group were distributed for municipal review to be finalized with the municipalities prior to the connection point and flow meter report being finalized Additional changes were incorporated based upon review and comment.

27. Rehabilitation Plan – No progress. *The SSES is required to be complete in order to develop the Rehabilitation Plan.*

28. Rehabilitation of Priority Areas of Collection System – No progress. *The rehabilitation plan is the precursor of this.*

29. Wet Weather Operation Plan – Completed.

E. Pretreatment Program

30. General Duty – In progress. The City has an approved pretreatment program and continues to regulate industrial users in the collection system.

31. Enforcement Response Plan (ERP) Implementation – In progress. The City continues to follow the ERP in order to encourage compliance from all industrial dischargers.

32. ERP - Penalty Escalation and Compliance Schedule – In progress and continuing. The City continues escalating penalties for all industries that are in significant non-compliance for a given parameter for two consecutive quarters. As penalty escalation had not been detailed in the ERP, the City has documented the process and amounts for consistency and as a reference tool.

33. ERP – Order, Permit Revocation, and Federal Referral – In progress. The City continues escalating the enforcement actions focusing on the financial penalties assessed to permittees who remain in significant non-compliance. The City continues to confer with US EPA while attempting to have industries achieve compliance. One industry has been problematic for an extended time following completion of a recent compliance agreement. US EPA requested additional information from the industry and has been speaking with the City regarding this permittee's recent compliance. The City met with an industry representative in 2012 to discuss recent compliance and plans for long-term attainment. During the fourth quarter of 2012, the industry installed an automated skimming system they believe will address their non-compliance. In 2013, the City received communication from a consultant indicating that another phase of pretreatment will be installed and construction has begun with space allocated for further pretreatment if necessary in the future.

34. Local Limit Adoption by Contributing Municipalities – In progress. All the municipalities with permitted industries have adopted the ordinance. Electronic versions of the City's sewer use ordinance had been provided to each municipality, engineer, and/or solicitor to prepare for adoption. This requirement is detailed in the revised intermunicipal agreement being reviewed and executed by the contributing municipalities. This will be reiterated in the annual request for information to complete the requisite annual system operations report.

35. Non-Residential Connection Evaluation and Investigation – In progress. The City has been working with the contributing municipalities to obtain this information periodically to summarize, survey, and evaluate nonresidential users in the service area that may need to be permitted. A standardized method for routine reporting will be developed in cooperation with the municipalities under the new intermunicipal agreement.

36. Increased Monitoring for Violators – In progress and continuing. The City continues to increase City sampling and encourage increased self-monitoring for industries with violations. In general, permits may be amended or re-issued requiring multiple resamples for parameters with prior compliance issues. Some permits require increased frequency of monitoring for multiple quarters of compliance prior to returning to a less frequent self-monitoring schedule. Additional monitoring by both the City and the industry is tracked and reported annually. The merits of increased self-monitoring are routinely discussed as industries are encouraged to do so to avoid SNC and publication.

37. Pretreatment Computerized Management System - In progress and continuing. The City continues data entry into a commercial pretreatment database as well as an abbreviated spreadsheet upon receipt of analytical results from both City and industrial sampling.

38. Local Limits Re-Evaluation – Completed. Evaluation submitted to US DoJ and US EPA on May 5, 2006. Comments were received from US EPA and the City initially worked with B&V to address the comments and concerns. The City's renewed NPDES permit, effective this quarter, includes requirements for local limits re-evaluation.

39. Quarterly SNC Reports to US EPA – In progress. The City has been monitoring penalty payment status and will continue to investigate errors in the penalty payment and posting as reported to the US EPA. The City is working interdepartmentally to resolve this issue for the past and determine how to do ensure accurate tracking and reporting in all systems. There were significantly less errors noted so that some progress seems to have been made. We will continue to work to resolve this issue as specific entries and adjustments have been identified. There continue to be industries that are not current with their payment, but they are decreasing in number on the specific pretreatment report and overall when doing the investigative reviews.

F. Funding

40. Funding – In progress. The 2013 budget was approved as presented to City Council with the budgeted transfer amount from the Sewer Fund to the General Fund remaining at $3,000,000. In order to stabilize finances, this transfer has been taken periodically throughout the year. The Administration submitted the 2014 budget to City Council who approved it with the budgeted transfer amount remaining at $3,000,000.

VI. REPORTING REQUIREMENTS

41. Report Contents and Certification

(a) Remedial Measures Paragraphs 7 through 40 – See above numbered sections.

(b) Anticipated Problems – See italics in above numbered sections.

(c) Additional Matters – See italics in above unnumbered sections.

(d) Certification Statement –

I certify under penalty of law that this information was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my directions and my inquiry of the person(s) who manage the system, or the person(s) directly responsible for gathering the information, the information submitted, is to the best of my knowledge and belief, true, accurate, and complete.

Ralph E. Johnson — Acting Director of Public Works

01/29/14 — Date

City of Reading
October, 2013
Wastewater Treatment Plant Upgrades
PM/CM Monthly Progress Report
Hill/Weston/Hazen and Sawyer

Executive Summary:
The Project Management/Construction Management (PM/CM) team continued work on Consent Decree related tasks as well as other supporting Wastewater Treatment Plant (WWTP) tasks. Critical items of October work included: discussions w/ PennVEST/PaDEP regarding loan/grant funding for the WWTP upgrades, continued design oversight work for the WWTP upgrades and secondary digesters rehabilitation projects, continued construction management services for the force main project, Act 2 related work at 6CPS, scoping for the Phase 1 improvements to the 6CPS, and project management/controls.

Anticipated work for November includes: technical discussion with regulators regarding the WWTP upgrades program, continued design oversight work for the WWTP upgrades and secondary digesters rehabilitation projects, continued construction management services for the force main project, scoping for the Phase 1 improvements to the 6CPS, and continued project management/controls tasks integrating the effort.

A more detailed task breakdown of the October work effort is included in the respective PM/CM's subcontractor invoices/reports.

Project Management (Hill: also see invoice):

- Project Management: review project requirements and maintained a working copy of the Construction Schedules, including a submission to the client on 10/22; initial review of Draw Schedule as part of the quarterly update.
- WWTP (design): assistance with the WWTP design, including subcontractor coordination (Hazen & Sawyer) regarding design oversight submissions (Scrubber Memo, Liquid TM comments, Trickling Filter effluent correspondence). Review the designer's proposed change order regarding the Process Comparison Evaluation and participate in a call with the client on 10/29.
- Force Main ("42"): assisted with construction-related issues, and project controls (e.g. submittals—flood wall penetration, lining of redundant pipe, progress meeting/agenda coordination for meeting #11, action item, Pact Change Order #2 (oxygen line) and proposed substantial completion punch list review).
- Secondary Digester Rehabilitation: review designer memo, correspondence related to the 10/3 submission, including coordinating comments from Hill scheduler and sub consultant, and assessing impacts to overall construction schedule. Discussions with client and submission of comments to project team on 10/25. Initial review of designer schedule deliverable, submitted on 10/31
- 6CPS: scoping of sub consultant's (H&S) requirements document for Phase 1 improvements. Review of sub consultant's (WESTON) cost summary table regarding the on-site contamination.

- Financial: PennVEST; participated in pre-meeting client discussions on 10/7 and attended a PennVEST/PaDEP, client meeting on 10/8. Follow-up w/ regulators regarding 2d Opinion scoping.
- Project Controls/Administration functions: project team coordination/integration including action item review, correspondence, and deliverables status. Invoice/monthly report preparation; contract management, including amendment scoping and discussions w/ client; reconciliation of billings to sub consultants and preparation of the PM/CM Tasks/Budget worksheet.

Project Controls (Hill: also see invoice):

- Performed required Project Controls functions: update of the PM/CM Tasks Costs spreadsheet. Updates to the Construction and Collection System Schedules. Preparation of the quarterly Draw Schedule, including assessment of RK&K's projected increased WWTP construction costs (Process Comparison Evaluation memo). Technical support and analysis of T&M's Secondary Digester schedule. Performed contract administration tasks. Monthly Report preparation.

WWTP Design Oversight (H&S: also see invoice)

- Prepared for and attended Process Design meetings.
- Performed a technical review of the Existing Scrubber System Evaluation.
- Review and comment on RK&K revised Liquid Technical Memo.
- Technical review and input on RK&K Biowin model.
- Coordinated with the City and PM/CM Team.

Primary Digester Rehab Design Support (H&S: also see invoice)

- Reviewed and provided comments on the designer's schedule and its relation to the WWTP schedule.
- Review and comments on permitting assumptions and process.

Force Main 42" Construction Management Services (Weston: also see invoice):

- On-site inspection, project management, and monitoring of Force Main project construction activities by the General Contractor /PACT Construction (GC).
- Review and management of Shop Drawings, RFIs, and construction schedule updates, and pay applications submitted by the GC.
- Prepared for and attended progress meetings with the contractor and meetings with City and design team to discuss construction issues.
- Project controls, budgeting, planning, and progress reporting.
- Subcontractor services for the inspection of removed steel force main sections on September 19,2013.
- Review of Draft Pipe Inspection Report provided by subcontractor.

Act 2 Consulting Services at 6&CPS (Weston: also see invoice):

- Update of the cost summary table for the environmental costs associated with the 6&CPS issues. Inclusive of the costs of Entech, PACT, and Weston.

City of Reading
November, 2013
Wastewater Treatment Plant Upgrades
PM/CM Monthly Progress Report
Hill/Weston/Hazen and Sawyer

Executive Summary:
The Project Management/Construction Management (PM/CM) team continued work on Consent Decree related tasks as well as other supporting Wastewater Treatment Plant (WWTP) tasks. Critical work items for November included: continued design oversight work for the WWTP upgrades and secondary digesters rehabilitation projects, continued construction management services for the force main project, and continued project management/controls tasks integrating the effort.

Anticipated work for December includes technical discussion with regulators regarding the WWTP upgrades program, continued design oversight work for the WWTP upgrades and secondary digesters rehabilitation projects, continued construction management services for the force main project, Act 2 related work at 6CPS, and project management/controls.

A more detailed task breakdown of the November work effort is included in the respective PM/CM's subcontractor invoices/reports.

Project Management (Hill: also see invoice):

- Project Management: reviewed project requirements and maintained a working copy of the Construction Schedules; initial review of the Program's Draw Schedule(s) as part of the quarterly update.
- WWTP (design): assistance with the WWTP design, including subcontractor coordination (Hazen & Sawyer) regarding design-related submissions (designer's proposed liquid design).
- Force Main ("42"): assisted with construction-related issues, and project controls (e.g. submittals—flood wall penetration, lining of redundant pipe, review progress meeting #11minutes/action items, sub consultant's (WESTON) pipe inspection report).
- Secondary Digester Rehabilitation: review designer memo, correspondence related to the 10/31 (Update #7) submission, including coordinating comments from Hill scheduler and sub consultant (H&S), and assessing impacts to overall construction schedule. Discussions with client and submission of comments to project team on 11/25. Initial review of designer schedule deliverable, submitted on 11/27 (Update #8).
- Financial: review of City provided Grants Report and discussions w/ PM's Grants coordinator. Research Bond Feasibility Report requirements.
- Project Controls/Administration functions: project team coordination/integration including action item review, correspondence, and deliverables status. Prepare Agendas for City Manager Update meetings held on 11/8, 11/22; prepare follow-on action items. Invoice/monthly report preparation. Contract management,

including amendment scoping and discussions w/ client; reconciliation of billings to sub consultants and preparation of the PM/CM Tasks/Budget worksheet.

Project Controls (Hill: also see invoice):

- Performed required Project Controls functions: update of the PM/CM Tasks Costs spreadsheet. Preparation of the draft quarterly Draw Schedule. Coordination with project team. Technical support and analysis of T&M's Secondary Digester schedule, amendment support, and Monthly Report preparation.

WWTP Design Oversight (H&S: also see invoice)

- Prepared for and attended Process Design meeting.
- Conducted a technical review of RK&K revised Solids Technical Memo.
- Technical review and evaluation of RK&K's proposed liquids design, including the Biowin model and several treatment alternatives.
- Coordinated with the City, RK&K, and PM/CM Team.

Primary Digester Rehab Design Support (H&S: also see invoice)

- Reviewed and commented on T&M's schedule.
- Reviewed the relation of the digester construction schedule to the WWTP improvement project schedule.

Force Main 42" Construction Management Services (Weston: also see invoice):

- On-site inspection, project management, and monitoring of Force Main project construction activities by the General Contractor /PACT Construction (GC).
- Review and management of Shop Drawings, RFIs, and construction schedule updates, and pay application.
- Prepared for and attended progress meetings with the contractor and meetings with City and design team to discuss construction issues.
- Project controls, budgeting, planning, and progress reporting.
- Subcontractor invoice for analysis of soil samples associated with compliance with the PA Clean Fill Policy.

City of Reading
December, 2013
Wastewater Treatment Plant Upgrades
PM/CM Monthly Progress Report
Hill/Weston/Hazen and Sawyer

Executive Summary:
The Project Management/Construction Management (PM/CM) team continued work on Consent Decree related tasks as well as other supporting Wastewater Treatment Plant (WWTP) tasks. Critical work items for December included continued design oversight work for the WWTP upgrades and secondary digesters rehabilitation projects, continued construction management services for the force main project, Act 2 related work at 6CPS, and project management/controls.

Anticipated work for January includes technical discussion with regulators regarding the WWTP upgrades program, continued design oversight work for the WWTP upgrades and secondary digesters rehabilitation projects, continued construction management services for the force main project, Act 2 related work at 6CPS, and project management/controls.

A more detailed task breakdown of the December work effort is included in the respective PM/CM's subcontractor invoices/reports (attached).

Project Management (Hill: also see invoice):

- Project Management: reviewed project requirements and maintained a working copy of the Construction and Draw Schedules. Reviewed the Collection System Program per City request, assessed impacts to the schedule and program; provided analysis to City.
- WWTP (design): assistance with the WWTP design, including review of and sub consultant coordination (Hazen & Sawyer) regarding design-related submissions (designer's proposed liquid design, technical memorandums, cost estimates). Prep for and attend designer meeting on 12/9. Review designer BODR outline/approach.
- Force Main ("42"): assisted with construction-related issues, and project controls (e.g. submittals—flood wall penetration, lining of redundant pipe, retainage/punch list correspondence, Pay Application #12).
- Secondary Digester Rehabilitation: review designer memo, schedule (Update #8) submission, including coordinating comments from Hill scheduler and sub consultant (H&S), and assessing impacts to overall construction schedule. Discussions with client and submission of comments to project team on 12/26. Initial review of designer schedule deliverables, submitted on 12/31 (Update #9).
- 6CPS (Act 2): coordinated the Act 2 issues (strategy, costs) w/ sub consultant (Weston).
- Project Controls/Administration functions: project team coordination/integration including action item review, correspondence, and deliverables status. Invoice/monthly report preparation. Contract management, including preparation

of amendment/task order deliverables; reconciliation of billings to sub consultants and preparation of the PM/CM Tasks/Budget worksheet.

Project Controls (Hill: also see invoice):

- Performed required Project Controls functions: reviewed the liquid process design alternatives, AS-1R and H-2R and their associated costs (Bossard). Coordination with project team regarding deliverables. Technical support and analysis of T&M's Secondary Digester schedule. Contract administration support, including amendment documentation, PM/CM tasks/Budget reconciliation, and Monthly Report preparation.

WWTP Design Oversight (H&S: also see invoice)

- Prepared for and attended Process Design meeting.
- Technical review and evaluation of RK&K's liquid design alternatives.
- Coordinated with the City, RK&K, and PM/CM Team.

Primary Digester Rehab Design Support (H&S: also see invoice)

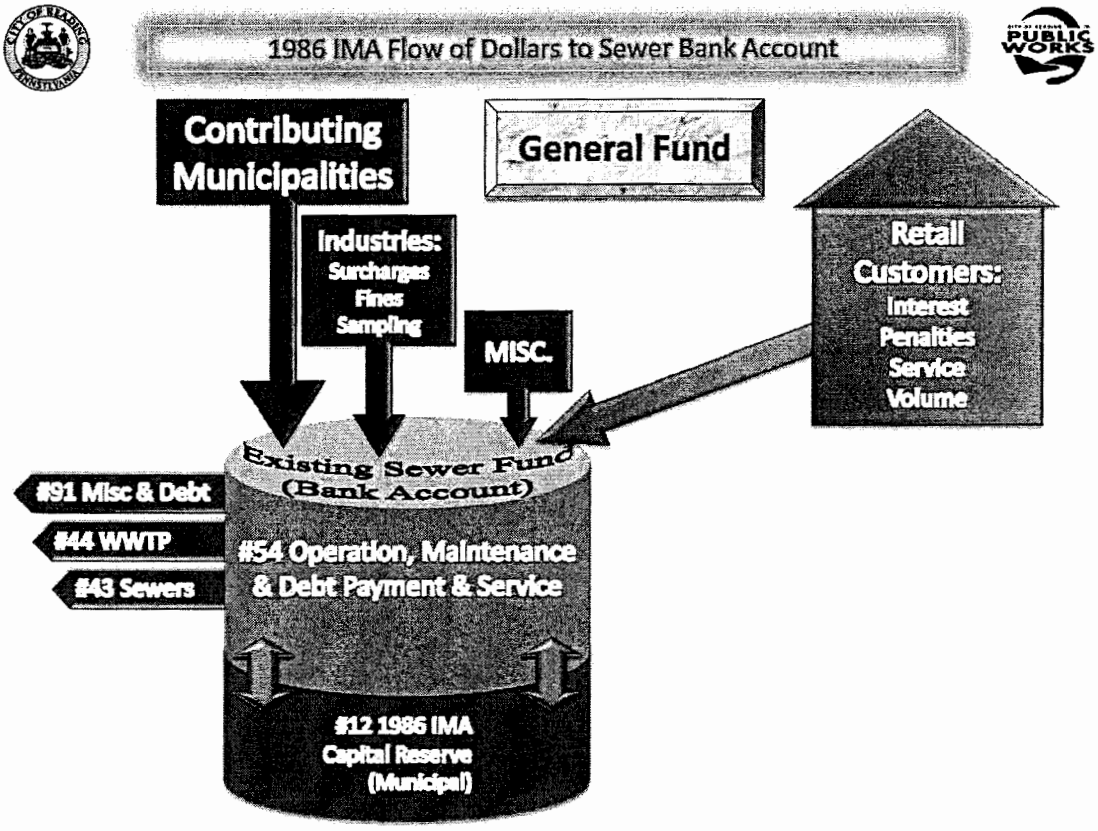
- Reviewed and commented on T&M's schedule.
- Reviewed the relation of the digester schedule to the WWTP improvement project schedule.

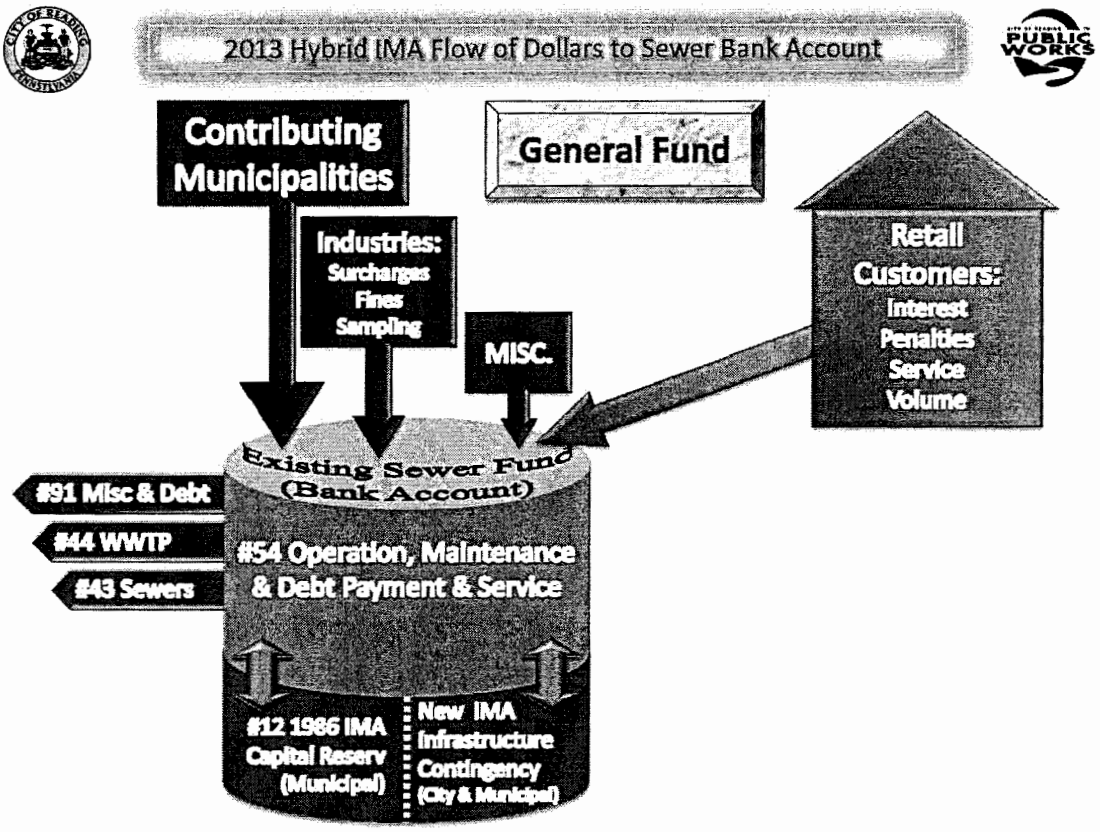
Force Main 42" Construction Management Services (Weston: also see invoice):

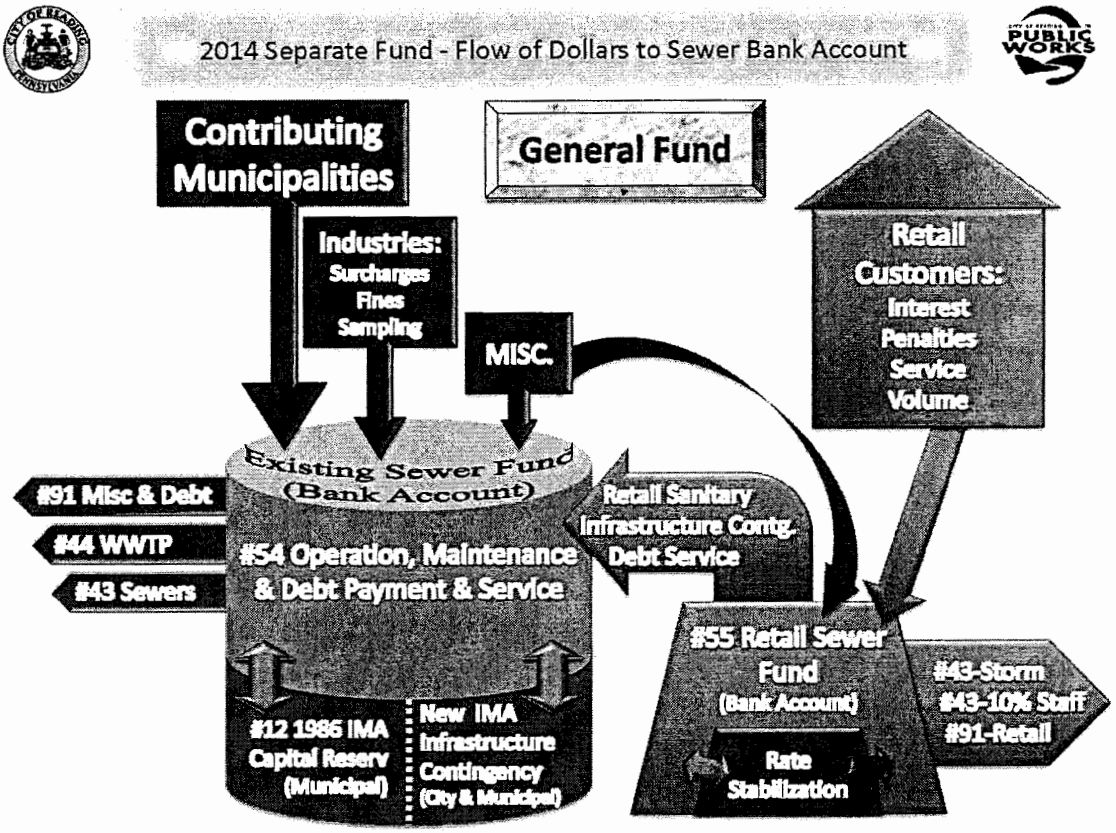
- Review and management of Shop Drawings, RFIs, and construction schedule updates, and pay application.
- Client and project team discussions related to the Force Main construction project.
- Project controls, budgeting, planning, and progress reporting.
- Subcontractor invoice for analysis of soil samples associated with compliance with the PA Clean Fill Policy.

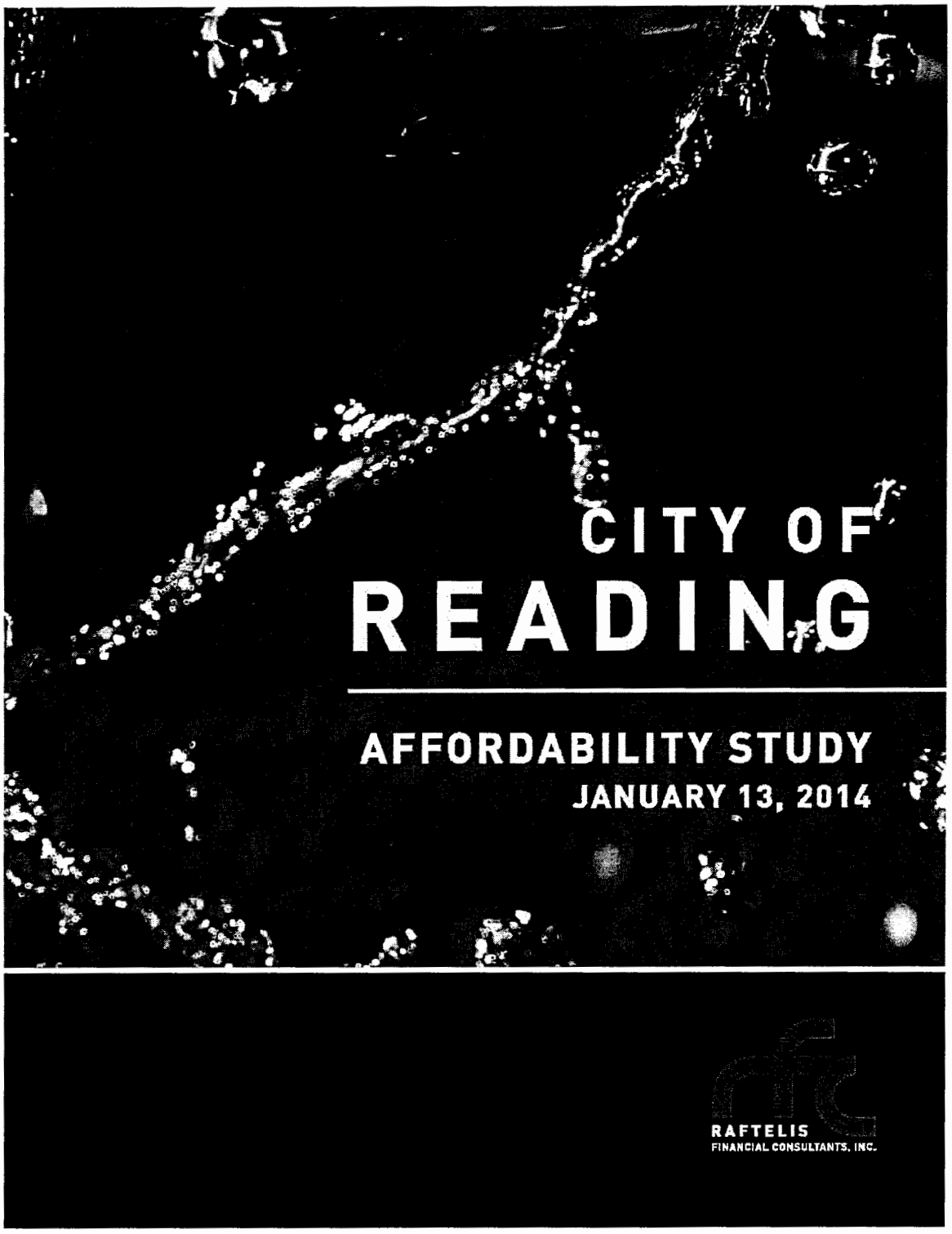
Force Main 42" Construction Management Services (Weston: also see invoice):

- Update of environmental costs associated with the 6&CPS investigations and activities.
- Preparation for and attendance at a meeting with UGI and City representatives to discuss updated cost estimate.


1986 IMA Flow of Dollars to Sewer Bank Account
Contributing Municipalities
General Fund
Industries:
Surcharges
Fines
Sampling
MISC.
Retail Customers:
Interest
Penalties
Service
Volume
Existing Sewer Fund (Bank Account)
#91 Misc & Debt
#44 WWTP
#43 Sewers
#54 Operation, Maintenance & Debt Payment & Service
#12 1986 IMA Capital Reserve (Municipal)


2013 Hybrid IMA Flow of Dollars to Sewer Bank Account
Contributing Municipalities
General Fund
Industries:
Surcharges
Fines
Sampling
MISC.
Retail Customers:
Interest
Penalties
Service
Volume
Existing Sewer Fund (Bank Account)
#91 Misc & Debt
#44 WWTP
#43 Sewers
#54 Operation, Maintenance & Debt Payment & Service
#12 1986 IMA Capital Reserv (Municipal)
New IMA Infrastructure Contingency (City & Municipal)


2014 Separate Fund - Flow of Dollars to Sewer Bank Account
Contributing Municipalities
General Fund
Industries: Surcharges Fines Sampling
MISC.
Retail Customers: Interest Penalties Service Volume
Existing Sewer Fund (Bank Account)
#91 Misc & Debt
#44 WWTP
#43 Sewers
#54 Operation, Maintenance & Debt Payment & Service
Retail Sanitary Infrastructure Contg. Debt Service
#55 Retail Sewer Fund (Bank Account)
Rate Stabilization
#43-Storm
#43-10% Staff
#91-Retail
#12 1986 IMA Capital Reserv (Municipal)
New IMA Infrastructure Contingency (City & Municipal)


CITY OF
READING
AFFORDABILITY STUDY
JANUARY 13, 2014
RAFTELIS
FINANCIAL CONSULTANTS, INC.

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Introduction to the Affordability Study

As the Sewer Rate Study was wrapping up, the City of Reading (City) engaged Raftelis Financial Consultants to conduct another study, with the primary theme of customer affordability. The Affordability Study included the evaluation and assessment of the relative affordability of the City's existing and forecasted future pricing for wastewater service. The final scope incorporated many additional items, and the Study was organized into the following seven tasks:

A. Task 1 – Overview

This Task documented the specifications and capabilities of the sewer system, including capacity, flows, and geographical make-up. RFC documented the demographical characteristics of the City's service area in this task as well. This analysis included general census data, such as income and unemployment.

B. Task 2 – Financial Plan Review

This Task involved a review of the City's forecasted revenue and expenditures. The City's financial plan, which was recently completed by RFC in the 2013 Sewer Rate Study, was used as a basis for this task. Reviewing the financial plan and forecast included the different revenue sources, such as revenue from City Customers, Bulk Customers (Municipalities), and miscellaneous items, and the major categories of expenditures, such as operations and maintenance and debt service.

C. Task 3 – Affordability Evaluation

This task involved a thorough affordability analysis of the City's rates for a typical customer using a straightforward approach and a more comprehensive approach. The straightforward approach calculates customer burden using the typical customer's bill and median household income. The more comprehensive approach incorporates the impact of annual utility costs on individual households based on a percentage of median household income and the financial capability of the community as a whole, which involves an examination of various criteria such as debt capacity, socioeconomic factors, and other financial conditions. Both approaches are supported by the EPA in the industry. Additionally, the burden on customers below the poverty line was analyzed.

D. Task 4 – Comparison of Affordability Analyses

A separate affordability analysis was conducted and delivered to the City in 2010 by another consulting firm. In this task, RFC compared the results of the 2010 Affordability Analysis to that of the results of Task 3. Specifically, similarities and differences between the two studies were identified. Further, commentary was provided on the variances and speculation on the level of respective impact.

E. Task 5 - Alternative Financial and Rate Plan

Currently, the City is scheduled to spend approximately $234 million over the next 6 years.[1] Based on the affordability results, RFC will determine the level of capital funding that is possible while maintaining affordable rates as defined and calculated in Task 3. The results will also include a theoretical alternative rate plan that supports the revised capital improvement plan based on the affordability analysis.

F. Task 6 - Benchmarking Analysis

RFC conducted a benchmarking analysis that compares and benchmarks the 2014 approved rates developed for the City with neighboring communities and utilities at the local, regional and national level. Residential and commercial rates were benchmarked, and the City was provided a benchmarking tool to evaluate comparisons at various meter sizes and levels of demand.

G. Task 7 - Documentation of Results

This task involved documenting the results of the Affordability Study. This report is the deliverable for this task and includes a thorough summary of each task's procedures, methodologies, and findings.

[1] The CIP is predominantly sewer related projects. The Sewer Fund also covers stormwater related capital and operating costs. Increases in stormwater related expenditures in future years could affect the Sewer Fund's overall capital and operating costs, which in turn could impact affordability.

Task 1. Overview

A. Wastewater System

The City of Reading (City) owns and operates a regional wastewater treatment plant (WWTP) on Fritz Island, in addition to numerous pump stations, flow meters, sewers mains, force mains and laterals, and other sewer related infrastructure. Built in 1929, the Fritz Island WWTP was initially intended to implement the region's secondary treatment process, while all primary treatment was to take place at the region's original plant, which was built in the late 1800s. In 1959, however, all treatment processes were consolidated under the roof of the larger Fritz Island facility in an effort to streamline the treatment process and anticipate demand growth.

Today, the City provides wastewater treatment service to roughly more than 20,000 retail accounts within the City. The City provides service to several thousand more people throughout the surrounding region through several large meter accounts. The City's initial plan was to provide wastewater treatment services solely to the people of Reading. However, as growth continued in the 1950s, especially in the suburban areas surrounding the City, outlying municipalities expressed an interest in having wastewater treatment capacity at the Fritz Island facility as well. Intermunicipal agreements with many municipalities were quickly developed around this time in order to adequately treat the wastewater from their residents. The City currently provides wastewater treatment services to the following municipalities: Alsace Township, Antietam Valley Municipal Authority (includes Lower Alsace Township and Mt. Penn Borough), Bern Township, Cumru Township, Kenhorst Borough, Laureldale Borough, Mohnton Borough, Muhlenberg Township, Robeson Township, Shillington Borough, Spring Township, and Wyomissing Borough.

In order to meet the demand of its retail and wholesale customers, the existing Fritz Island WWTP was designed and constructed in the 1980s for a permitted hydraulic capacity of 28.5 million gallons per day (MGD) (Average Daily Flow) and 42.75 MGD (Maximum Monthly Flow) with discharge to the Schuylkill River. The WWTP utilizes a two stage trickling filter system for secondary treatment followed by a fixed film tertiary treatment process for ammonia-nitrogen removal. The City's sanitary sewer system includes four pump stations: Sixth and Canal pump station, 18th Ward pump station, 19th Ward pump station, and West Reading pump station. Three of the four pump stations have flow metering with both the 6th and Canal and 18th Ward pump stations being tracked in the City's SCADA system. The 19th Ward pump station uses a data logger to store flow data which is then periodically downloaded. The West Reading pump station does not have a flow meter but does have hour meters on the pumps. A pump station drawdown test was completed late in 2012, and the City is investigating methods to track pump run time and determine when more than one pump is running. In addition to the City's four pump stations, the discharging sewer systems of Bern Township, Cumru Township, Kenhorst Borough, Laureldale Borough, Muhlenberg Township, Robeson Township, and Spring Township operate their own pump stations. The discharging municipal pump stations are not expected to receive flows greater than their design capacity during the next five years.

Exhibit 1.1 - Aerial View of Fritz Island Wastewater Treatment Plant

The other major component of the City's wastewater system is the collection and conveyance system, which is composed of PVC, terracotta brick, and cast and ductile iron sanitary sewers. Sewer diameters of the existing sanitary system range in size from 6" to 54", including the outlying municipal sewer systems. The City repairs and replaces the collection system pipes on an as needed basis in response to reported problems, as well as routine inspections. Maintenance, monitoring, and inspection of the City's sanitary sewer system are conducted by the Department of Public Works, Utilities Division, and Sanitary and Storm Sewers Team. The Sanitary and Storm Sewers Team staffs the following positions: 1 Superintendent, 1 Working Foreman, and 11 Equipment Operator II. The Sanitary and Storm Sewers Team spends much of its time repairing storm and sanitary sewers on an as-needed basis.

The costly upkeep associated with managing the City's capital intensive wastewater system has been exacerbated by heightened government regulation in recent years. Throughout the past 25 years, the City's sewerage system has had consent orders and agreements imposed upon it by various environmental agencies, namely the United States Environmental Protection Agency (EPA) and Pennsylvania Department of Environmental Protection (PA DEP). The City is currently operating under a Consent Decree with the US Department of Justice and US EPA, and PA DEP which was entered on November 7, 2005. This most recent Consent Decree details studies that need to be performed in order to develop an industrial pretreatment program, in addition to a new capital improvements plan (CIP) and rehabilitation plan for the treatment plant and collection system. The City is also required to evaluate the existing treatment facilities to determine their ability to meet current and projected capacity, loadings, and permit limits during all potential conditions. Since 2005, the City of Reading WWTP has maintained excellent permit compliance. One of the ongoing challenges facing the City is paying for Consent Decree related capital improvements.

The aforementioned Consent Decree dictates certain guidelines that the City must follow in order to improve various wastewater system concerns. Specifically, these guidelines require that the City make

certain large-scale capital improvements to the Collection System and Wastewater Treatment Plant. As a result, the City and its consultants have worked with regulatory agencies throughout the year to address the requisite capital improvements in a logical, cost-effective manner. As it currently stands, the City's CIP is projected to be $234.8 million from 2013 through 2019. Moving forward, the City has decided that the Utilities Division should use revenue bonds as the primary funding mechanism. The Sewer Fund's debt service obligations are currently about $3 million per year. However, as previously mentioned, the City will be required to rely much more heavily on debt to fund the CIP. As a result, the Sewer Fund's debt service obligation will increase by roughly 553% over the next seven years from $2.76 million in FY 2013 to $18.04 million in FY 2019. The majority of the proposed debt service will result from following three planned issuances, which have been planned to coincide with projects in the CIP: FY 2014 Bonds, FY 2015 Bonds, and FY 2017 Bonds.

B. The City of Reading

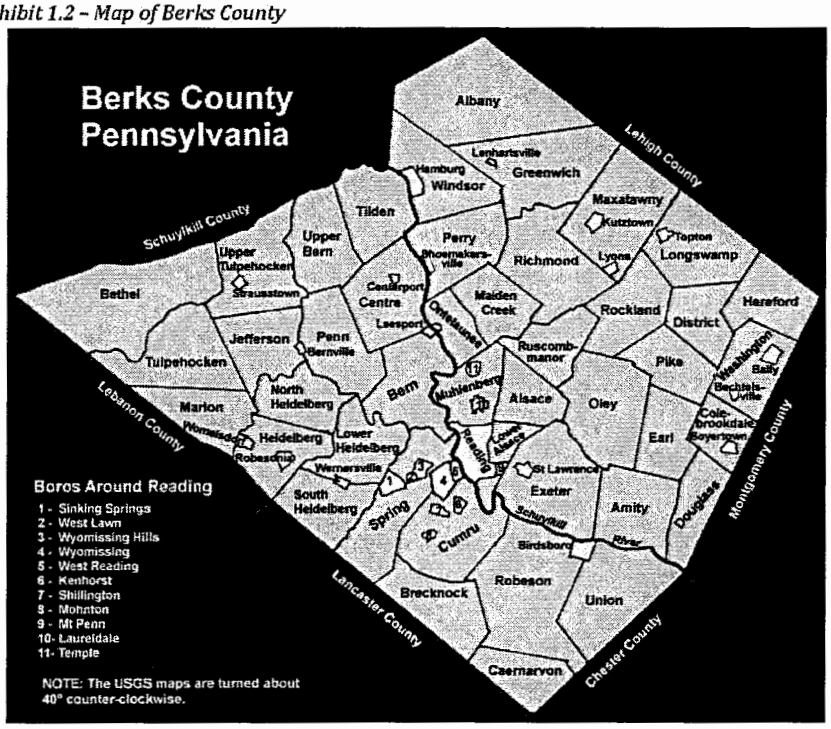
The City of Reading is situated at the intersection between the east Penn-Lebanon Valley and the Schuylkill River in southeastern Pennsylvania. Officially established in 1748, the City was named in honor of William Penn's birthplace in Reading, England. Today, it is the principal city of the Greater Reading Area, in addition to being the seat of Berks County. There are 88,102 people[2] and 30,104 households[3] residing in the City of Reading, making it the fifth most populous city in the state. The City lent its name to the now-defunct Reading Railroad, which transported anthracite coal from the Pennsylvania Coal Region to the eastern United States via the Port of Philadelphia. Today, manufacturing, business services, medical device makers, and healthcare companies are central to the region's economy. However, agriculture and food processing is the most important industry in the Greater Reading Area. The agriculture industry's prevalence in Reading stems from both tradition and the City's variable, yet relatively mild climate. Summers are warm and humid with average July highs around 85 °F; winters bring freezing temperatures, but usually move above freezing during the day's warmest point. Also, total precipitation for the entire year is around 45 inches on average.

In spite of its comparative advantage in the agriculture industry, Reading maintains one of the highest poverty rate in the nation among cities with a population greater than 65,000. According to American Community Survey (ACS) findings, an estimated 37.3% of the City's population is living below the poverty line. Additionally, ACS estimated that in 2011 the City's median household income (MHI) and per capita income were $27,416 and $13,350, respectively, both below the national average[4]. An economic consideration that helps offset the low MHI is the lower cost of living in the City. The cost of living in Reading is 7.6% lower than the Pennsylvania average and 6.1% lower than the national average[5]. While the relatively low cost of living is due in large part to the City's low housing costs, other cost categories such as Goods and Services, Groceries, Health Care, Transportation, and Utilities are on par with the national average. Pennsylvania has a flat tax rate of 3.07% levied on earned and unearned income, with no standard deductions or personal exemptions. The state also imposes a state sales tax of

[2] US Census Bureau 2012 Estimate
[3] http://www.city-data.com/housing/houses-Reading-Pennsylvania.html
[4] http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_11_5YR_DP03
[5] http://www.areavibes.com/reading-pa/cost-of-living/

6% from which food (groceries) and most clothing are exempt. In addition, Berks County imposes a 3.6% earned income tax on the residents of Reading. Finally, Berks County imposes a real estate tax rate of 15.689 Mills on the property owners of Reading. This simply means that each property owner must pay $15.689 for every $1000 worth of real estate owned.

Exhibit 1.2 - Map of Berks County



C. City Governance & Relationship with Utilities Division

The City of Reading transitioned from the Commission form of government to the Home Rule Strong Mayor form of government in 1996. Under the Home Rule Charter, the City is divided into six districts, with each district selecting one Council member to be the voice of that district. In addition, the President of Council is elected at-large as the presiding officer of Council and has the same voting powers as the other six District Council members. The President interacts with the Mayor and other government entities and acts as the voice of Council.

The City Council currently has five committees: Standard of Living; Economic Development; Strategic Planning; Finance, Audit, and Budget; and Nominations and Appointments. The Standards of Living

Committee is charged with overseeing the Department of Public Works, which the Utilities Division falls under.

As a home rule/strong mayor form of government, the City provides all municipal services to its residents. Those services include: public safety (police, fire, and emergency medical services), highways and streets, economic development, public improvements, planning and zoning, parks, recycling, stormwater and sanitary sewers, and wastewater treatment. The City owns the potable water system but leases its operation and maintenance to the Reading Area Water Authority. Sanitary and storm services are paid for via the Sewer Fund. The City's Sewer Fund is classified as an Enterprise Fund because it is maintained to account for activities that are financed and operated in a manner similar to a private business, with the intent that the costs (expenses, including depreciation) of providing services on a continuing basis be financed or recovered, primarily through user charges. In order for the Utilities Division to increase user charges, however, City Council must approve rate changes and modifications to the sewer ordinances.

Task 2. Financial Plan Review

A. Overview

The financial plan for the City was recently established as part of the 2013 Sewer Rate Study. The development of the financial plan consists of identifying and projecting the revenue and expenses for the City over a ten-year forecast period from FY 2014 through FY 2023. This Task involves a review of the City's forecasted revenue and expenditures. Reviewing the financial plan and forecast will include the different revenue sources, such as revenue from City Retail Customers and Bulk Municipal Customers, and the major categories of expenditures, such as operations and maintenance and debt service. The balances for City funds will be analyzed for financial sustainability and meeting targets over the life of the forecast.

A significant component of this task is to review the annual debt service payments and resulting impact associated with revising the capital improvement schedule for an expedited approach. During this task, the two financial scenarios of funding the capital improvement plan that were developed by Financial S&Lutions were implemented into the financial plan for analysis.

B. Revenue Requirements

Revenue requirements typically include all operation, maintenance, and capital costs incurred by a utility to operate the system. For the City's wastewater utility, revenue requirements are comprised of three main components: operating expenses, capital expenses, and contributions to capital funds. These revenue requirements are inclusive of the costs associated with providing wastewater service to not only the City's retail customers but also its municipality, or bulk, customers: thirteen communities that send their respective flows to the City for treatment.

Operating Expenses

The City's wastewater operating expenses were forecasted in the financial plan. Using the FY 2013 budget as the foundation for looking at costs, operating expenses were projected for each year of the forecast. To more accurately represent costs, the City acknowledged that operating costs would likely increase in future years as a result of inflation.

Exhibit 2.1 – Inflation Factors for Operating Expense Forecast

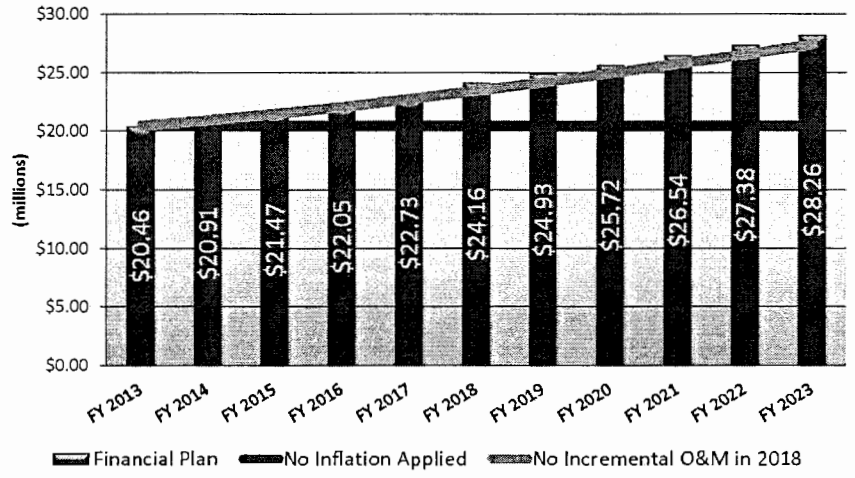
Year(s)	Annual Inflation Factor
FY 2014	2.5%
FY 2015	3.0%
FY 2016	3.0%
FY 2017	3.5%
FY2018	7.0%
FY 2019	3.5%
FY 2020 - 2023	3.5%

After discussion with City staff related to estimated costs, it was concluded that a systematic increase to inflation was reasonable to develop projected O&M costs. Due to the commodity intensive nature of the wastewater industry, particularly the use of chemicals and electricity, which have increased more significantly than general inflation over the past decade, the City has decided increasing inflation reflects a conservative yet reasonable approach. Exhibit 2.1 shows the annual inflation factors used in the forecast. Budgeted costs were initially escalated by 2.5%, which is approximately the 20 year average of CPI. Inflation was ramped up to 3.5% per year.

Exhibit 2.2 presents the wastewater operating expenses. The blue bars represent the forecast in the financial plan. The redline in Exhibit 2.2 shows the operating expenses if no inflation was applied, rather the costs remained constant at $20.46 million per year. The difference, or cost of inflation, is $39.54 million dollars over the life of the forecast.

In Exhibit 2.1, the inflation for FY 2018 was significantly higher than the other years. This additional inflation was implemented to capture incremental operating costs for additional energy needs when the new treatment process will be brought online in 2018. Considering additional future expenses, such as this, is an important part of the financial plan development. The green line in Exhibit 2.2 represents the operating costs if no incremental cost was included in FY 2018. The difference in the forecast of operating expenses totals $4.68 million from 2018 through 2023. In other words, if the City hadn't included this incremental operating costs, forecasted rates would have been forecasted lower than actual costs, and the City would experience an ongoing deficit from FY 2018 onward until additional rate adjustments were put in place to account for the costs.

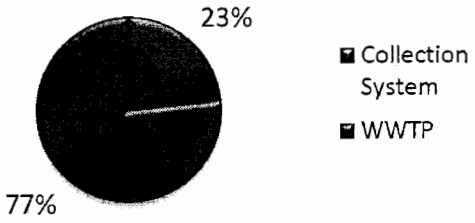
Exhibit 2.2 – Wastewater Operating Expenses



Capital Expenses

The City is facing a very large capital improvement plan (CIP), which includes capital projects that will cost approximately $234.8 million dollars from 2013 through 2019, as developed by Financial S&Lutions. The projects involve the collection system and treatment facility, and Exhibit 2.3 shows the overall breakdown of costs between the two components of the system. The City has higher than typical capital expenditures due to completing final tasks to fulfill amended Consent Decree mandates, which represent the majority of these costs.

Exhibit 2.3 – Wastewater CIP



During the 2013 Sewer Rate Study, the project cost of the CIP was not altered. However, the schedule of the projects was modified. The CIP schedule was revised and a compressed schedule was developed. This had a direct impact on the financial plan because the timing of the debt issuances was also expedited as shown in Exhibit 2.4.

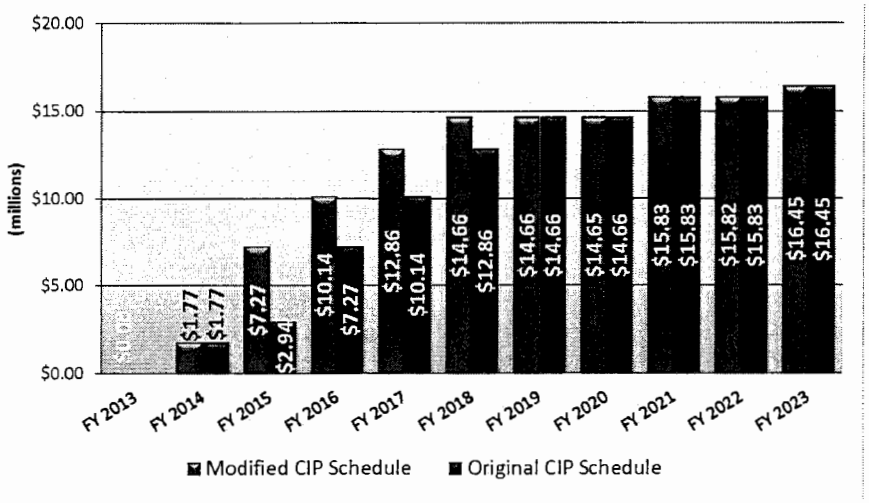
Exhibit 2.4 – Debt Issuance Schedule

Original Schedule	
Timing of Bonds	Bond Amounts
FY 2014	$42.5 million
FY 2016	$105.6 million
FY 2018	$65.3 million

Modified Schedule	
Timing of Bonds	Bond Amounts
FY 2014	$42.5 million
FY 2015	$105.6 million
FY 2017	$65.3 million

The City has opted to pursue Revenue Bonds for funding the CIP. The resulting proposed debt service annual payments are presented in Exhibit 2.5. These represent the principal and interest payments that the City will pledge to make to the holders of the bonds issued to fund the City's capital program. Existing debt service is excluded from the chart, but is the same under each schedule at approximately $3 million per year. As a result, the Fund's debt service obligations will increase significantly over the next ten years to approximately $19 million in FY 2021. From the chart, the resulting burden on the customer is the same at the end of the forecast, but the modified schedule places the same burden on customers one year earlier.

Exhibit 2.5 – Wastewater Proposed Debt Service



The issuances have been planned to coincide with projects in the CIP. The specifics of the debt issuances, such as interest rate and repayment schedule, have been developed by Financial S&Lutions LLC and incorporated into the financial plan. Each projected bond issue includes all estimated financing costs to issue the bond and a full debt service reserve fund. The period for each amortization was 30 years. A true interest cost of 5.40% was used in the projections, which is the historical Bond Buyer revenue index for the City's credit, although the City may experience a better rate when the debt issuances are finalized.

Contributions

Under the new intermunicipal agreement with bulk customers, both the City and the municipalities contribute to the Infrastructure Contingency Fund to account for large unplanned emergency events. The contribution equals 10% of the respective debt service expense allocation. The contributions will continue to be paid by all parties until the fund balance reaches $20 million. Based on the financial plan, this will not occur in the forecast period, and therefore contributions are programmed for each year, ranging from nearly $500,000 in FY 2014 to $1.9 million in FY 2023.[6]

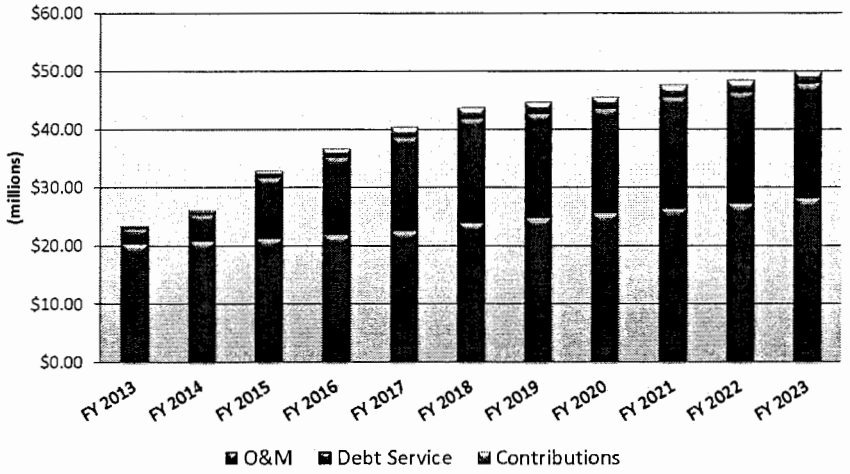
Total (Gross) Revenue Requirements

As shown in the 2013 Sewer Rate Study, the total (gross) revenue requirements from the main components described above are presented in Exhibit 2.6. It is important to note, as shown in several instances above, that forecasting expenses is a detailed and delicate exercise, and ultimately several

[6] This forecast assumes all bulk customers operate under the new IMA. At the time of this report, several bulk customers were still operating under the old IMA, which results in a rate based upon a calculation with lagged audited actual expenses with a 20% markup.

assumptions need to be made based on the best data available and professional experience of the consultant and City staff.

Exhibit 2.6 – Total (Gross) Revenue Requirements



C. Revenue

Two revenue sources account for nearly all of the revenue recovered by the City. These sources are retail revenue (City customers) and bulk revenue (municipalities). The City has a third, much smaller source called Other Revenue, which includes revenue from interest earnings and fees.

Bulk Revenue

The second largest source of revenue for the City is from rates and charges to the municipalities that exist as wholesale or bulk customers. This is likely the most uncertain revenue stream due to the status of the intermunicipal agreements (IMA). A new IMA has recently been negotiated, and the City is currently working to transition all the communities from the old IMA to the new IMA, but unfortunately that did not occur at one time. Revenue is being recovered according to the old IMA for some municipalities and according to the new IMA for others. For the financial plan, the revenue stream from the municipalities is assumed under the new IMA process, which calculates their share of the revenue requirements on a cash needs basis. Until all municipalities are converted to the new IMA, the revenue stream will be difficult to predict.

Retail Revenue

The largest source of revenue for the City is revenue from retail rates charged to City customers. The retail revenue is calculated using the fiscal year's projected number of accounts, demand, and rates. In the financial plan, to calculate annual revenues, units of demand and customer accounts are kept

constant, with no annual increase or decrease to total units. This is based on the lack of a trend, either declining or inclining, and therefore the plan assumes zero change.

The true rate adjustments to recover the revenue required from the operating and capital expenses previously discussed are shown in Exhibit 2.7 in orange. One can see that the rate increases are variable. It was determined that a smoothing approach would be better for customers. The resulting systematic rate adjustments, shown in green, at 4.0% per year were preferred. This can be accomplished using a Rate Stabilization Reserve, which uses deferred revenue from one year to mitigate a deficit in another. This process was adopted in the City's financial plan. How these sets of rate adjustments impact the revenue stream is presented in Exhibit 2.8.

Exhibit 2.7 – Comparison of Rate Adjustments

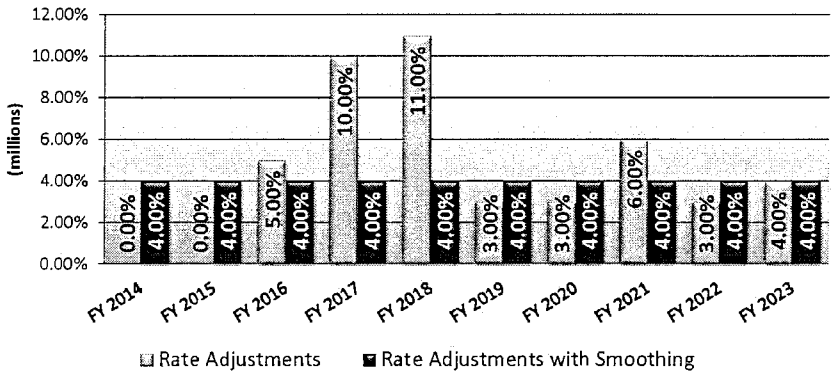
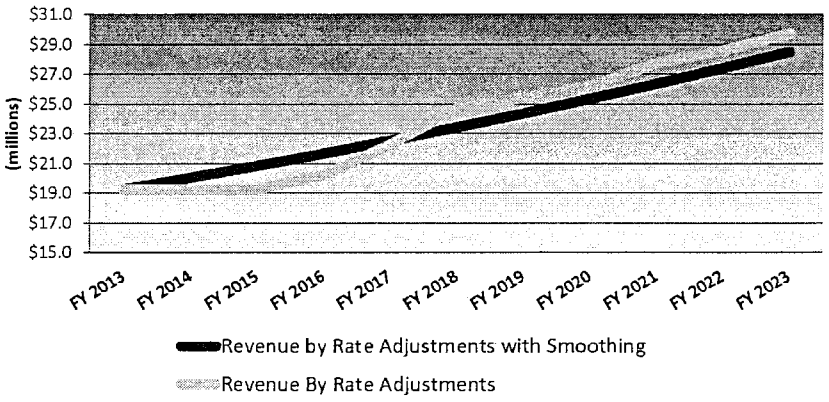


Exhibit 2.8 – Comparison of Rate Revenue Streams based on Different Rate Adjustments



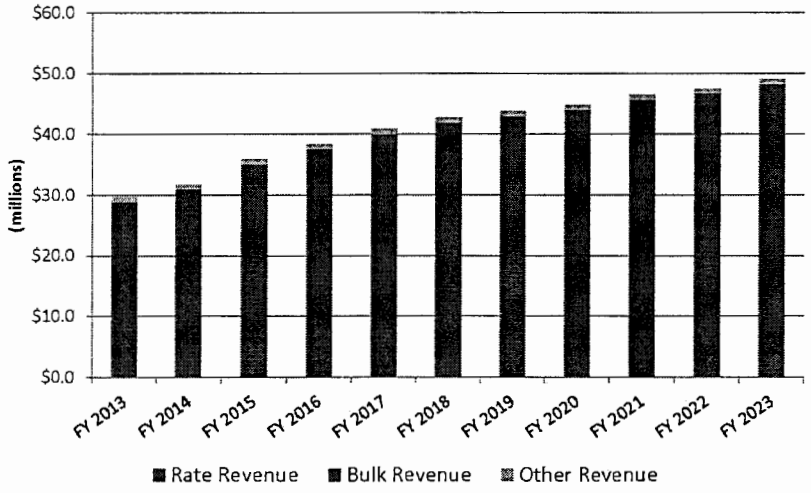
Other Revenue

The City has a third main source of revenue, which is called Other Revenue, or miscellaneous revenue. This includes interest earned on investments, user fees, high strength surcharges, and other fees. These also offset the total revenue requirements to derive the net Wastewater revenue requirements to be recovered from City retail rates. These miscellaneous sources of revenue are not expected to increase on an annual basis and are therefore held constant in the financial plan at $792,500 per year.

Total Revenue

Exhibit 2.9 presents the annual revenue from the financial plan, showing annual revenue from the three sources just described. The transfers from the Rate Stabilization Reserve are not included in this chart. The contributions range from $650,000 to $1,250,000, as shown in Exhibit 2.10 below (the full financial plan).

Exhibit 2.9 – Revenue from Three Main Sources



D. Summary of Financial Plan

Exhibit 2.10 provides a summary of the City's financial plan, which incorporates all the items reviewed above. The financial plan ensures revenue sufficiency while mitigating the rate burden on City customers.

Exhibit 2.10 –Financial Plan

	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Revenue										
Retail Revenue	$20,017,019	$20,817,700	$21,650,408	$22,516,424	$23,417,081	$24,353,764	$25,327,915	$26,341,031	$27,394,673	$28,490,460
Recommended Rate Revenue Increase	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%	4.00%
Bulk Revenue	$10,895,650	$14,257,811	$15,937,781	$17,527,761	$18,602,993	$18,670,098	$18,683,480	$19,271,859	$19,357,967	$19,732,509
Other Revenue	$792,500	$792,500	$792,500	$792,500	$792,500	$792,500	$792,500	$792,500	$792,500	$792,500
Revenue from Rate Stabilization	$0	$0	$0	$650,000	$1,100,000	$1,000,000	$800,000	$1,250,000	$1,000,000	$1,100,000
	$31,705,169	$35,868,011	$38,380,689	$41,486,685	$43,912,574	$44,816,362	$45,603,894	$47,755,390	$48,545,140	$50,115,469
Revenue Requirements										
O&M	$20,914,081	$21,471,304	$22,045,243	$22,734,926	$24,162,571	$24,926,361	$25,716,884	$26,535,075	$27,381,902	$28,258,369
Debt Service	$4,761,461	$10,500,308	$13,367,835	$16,081,759	$17,917,065	$18,031,606	$18,054,447	$19,229,436	$19,205,725	$19,845,029
Contributions										
Infrastructure Contingency Fund	$476,146	$1,050,031	$1,336,784	$1,608,176	$1,791,707	$1,803,161	$1,805,445	$1,922,944	$1,920,573	$1,984,503
City-Only Capital and Infrastructure Renewal	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$0	$0	$0	$0	$0	$0
Contribution to Rate Stabilization Fund	$4,500,000	$1,800,000	$600,000	$0	$0	$0	$0	$0	$0	$0
Operating Reserve	$53,481	$46,369	$20,827	$61,823	$41,231	$55,234	$27,118	$67,935	$36,940	$27,568
	$31,705,169	$35,868,011	$38,380,689	$41,486,685	$43,912,574	$44,816,362	$45,603,894	$47,755,390	$48,545,140	$50,115,469
Debt Service Coverage on Senior Lien	3.56	1.74	1.56	1.47	1.36	1.37	1.37	1.35	1.35	1.34

Debt Service Coverage

Utilizing revenue bonds for future funding needs will require the City to meet a specified level of debt service coverage. The debt service coverage equals the revenue less operating expenses. From preliminary discussions with the City's financial advisor, it is assumed that the City will need to meet a minimum of 1.25. For planning purposes, the City will use a target coverage ratio of 1.30, and Exhibit 2.11 demonstrates that the City exceeds this target every year of the financial plan.

Exhibit 2.11 –Senior Lien Debt Service Coverage Calculation (Revenue and Expenses are in millions $)

	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Debt Service Coverage										
Total Revenues	$31.71	$35.87	$38.38	$40.84	$42.81	$43.82	$44.80	$46.51	$47.55	$49.02
Less: Operating Expenses (excluding minor capital)	($20.07)	($20.63)	($21.21)	($21.89)	($23.32)	($24.09)	($24.88)	($25.70)	($26.54)	($27.42)
Rate Stabilization										
Less: Contribution (Deferred Revenue)	($4.50)	($1.80)	($0.60)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Plus: Use of Revenue	$0.00	$0.00	$0.00	$0.65	$1.10	$1.00	$0.80	$1.25	$1.00	$1.10
Revenue Available for Debt Coverage Calculation	$7.13	$13.44	$16.58	$19.59	$20.59	$20.73	$20.73	$22.06	$22.00	$22.70
Senior Lien (Revenue Bonds and Pennvest Loan)	$2.00	$7.74	$10.61	$13.32	$15.12	$15.14	$15.16	$16.33	$16.33	$16.95
Debt Service Coverage	3.56	1.74	1.56	1.47	1.36	1.37	1.37	1.35	1.35	1.34

Task 3. Affordability Evaluation

A. Overview

Raftelis Financial Consultants, Inc. ("RFC") was engaged by the City of Reading's Sewer Division (City) to conduct an affordability analysis. Specifically the scope includes identifying the affordability concerns of City customers in the upcoming year, 2014. Additionally, the analysis will analyze the potential affordability concerns in 2019, the final year of a $234 million capital improvement plan.

To investigate affordability in this study, RFC will follow an EPA guidance document. RFC will also provide expertise and background relating to the national debate surrounding affordability in the industry.

B. Affordability in the Industry

In the broadest conceptual sense, affordability may be described as the ability of customers to pay for utility services billed to them[7]. Exactly how affordability should be measured, however, is dependent upon the objectives of the reviewer. Is utility management interested primarily in evaluating affordability for "average" residential customers? Or do they want to estimate how many low income customers might have trouble paying their water and sewer bills? Or maybe the utility needs to demonstrate whether or not a new federal mandate will create an unmanageable financial burden. Each of these situations would create a different perspective on how affordability should be measured. Furthermore, each utility's customer base is unique, both in terms of economic profile, demand patterns, and data availability. For all of these reasons, affordability is very much an art as much as it is a science.

Impact upon Utility Finances

Rate affordability is not merely an abstract concept. Charging rates that many customers cannot afford to pay will result in real costs to the utility. These costs are in addition to the social issues and potential public health risks created when a segment of the population cannot afford access to clean water. Potential risks the utility may incur include:

- **Bill delinquency**
  - Uncollectible receivables
  - Turn-on / turn-off costs[8]
  - Increased administrative overhead[9]
  - Costs for hiring outside collection firms
  - Need for higher reserves to cover uncollectible accounts

[7] *Water and wastewater finance and pricing: a comprehensive guide*, George A. Raftelis, CRC Press, 2005

[8] The Sewer Utility pays for this indirectly, as it is administered by Reading Area Water Authority, and passed along to the Sewer Utility.

[9] The Sewer Utility pays for this indirectly, as it is administered by Reading Area Water Authority, and passed along to the Sewer Utility.

- **Revenue shortfalls**
  - Expected revenues may not materialize if new rates are burdensome
- **Customer conflict**
  - The mere perception of affordability will result in customer rebellion
  - A public good-faith effort at preserving affordability can improve customer relations

Measurement

Translating affordability concepts into numerical measures requires due diligence and careful judgment. Any affordability test that does not consider the context and purpose of the test is of limited usefulness apart from an academic exercise. In order to provide affordability measurements that are of real value to decision-makers, the analyst should consider the following issues:

- Relevance to the decisions being considered and the utility's environment (financial, political, and operational context)
- Feasibility of the proposed analysis (data availability, level of expertise required, level of effort)
- Ease of Understanding (not so complex as to baffle the user)
- Credibility of the analysis (data integrity, supporting documentation, precedence)

Although it may not be possible – or even necessary – to satisfy every objective, decision-makers should be skeptical of measurements that do not take each of these objectives under careful consideration. Simply selecting the easiest and most convenient affordability test will rarely be of value in making well-informed decisions.

Despite a growing effort by industry leaders to reach consensus on some type of standardized affordability measurements, there remains an absence of agreement through the Utility Industry for a standardized set of affordability evaluation procedures or benchmarks. Thus, it has become the responsibility of each utility to adapt evaluation techniques and numerical criteria on the basis of the decision-makers objectives, the availability of data, and the characteristics of the service area.

As shown in Exhibit 3.1 below, the data used in measuring affordability fall into two categories. The first category focuses on the rate burden for a hypothetical customer from a specific billing class or sub-class. The second category relates to the financial strength and economic well-being of the community as a whole.

Exhibit 3.1 –Financial Indicators

Customer Burden Indicators
- Typical bill amount
- Household income (low income, average, other statistics)
- Consumer Price Indices
- Number of customers at different burden levels
- Poverty levels
- Bill ranking against other utilities
- Account delinquency

Community Financial Strength Indicators
- Utility and municipal bond ratings
- Median Household Income/Adjusted National MHI
- Unemployment rate (local/national)
- Property tax collection rates
- Net debt/property market value
- Property tax revenues/total property market value

Customer Burden Indicators

Rate affordability for specific customer groups cannot be determined without a way to measure the rate burden for these groups. This burden is most frequently quantified by an index that represents the percentage of household income consumed by water and wastewater bills. If this index exceeds a certain percentage for a certain category of household, the water and wastewater rates are considered to be "unaffordable" for that particular household. Determining the parameters of this index requires answering several questions.

- Should the index represent the typical residential customer, an economically disadvantaged customer, or a range in between?
- Should an affordability index be calculated for commercial customer classes?
- What monthly water/wastewater demand should be assumed for calculating the bill? Should indices be calculated for multiple demand levels?
- How should income levels be estimated for the representative customer?

The answers to each of these questions depend on the goals of utility management, the utility's financial and technical resources, and the financial planning decisions under evaluation.

Community Financial Strength Indicators

Community strength indicators provide a context within which customer burden measurements may be interpreted. As important as customer affordability tests are, they lose some of their value if presented in a vacuum. Even though utility managers may strive to avoid burdensome or inequitable rate impacts, their options are limited by the financial strength of the utility and of the community. Utilities enjoying robust financial health have the option of mitigating rate impacts by using low income assistance programs, rate stabilization funds, financial planning studies, sophisticated rate restructuring, and creative financing arrangements not available to financially weaker utilities. Utilities located in financially strong communities usually benefit from expanding customer bases and business development programs. In short, strong systems typically have access to multiple options for reaching their affordability objectives, while systems with weak fundamentals may have few or no options.

EPA Affordability Standards

In 1997, the EPA developed a two phased approach to assess the financial capability of municipalities. In 2002, however, EPA was directed by Congress to reevaluate how it measures affordability for small systems. As a result, the EPA has been working with the National Drinking Water Advisory Council and the Science Advisory Board to determine what changes should be made to the EPA's standardized national affordability criteria. Because EPA affordability criteria are inevitably also adopted by many decision-makers for general-purpose use, they have a significant influence on how the industry views affordability. This is true even though these affordability tests were originally designed primarily to evaluate the utility cost burden of new regulations.

After extensive discussion among members of the working group and the EPA, there is still deep disagreement as to what affordability criteria would be most suitable. The EPA and most workgroup members have indicated a preference for measuring affordability as a percentage of Median Household Income (MHI), which has been used as a central component of EPA affordability measures for more than 10 years. Because MHI data is readily available, simple to understand, and already used in EPA's affordability test, its appeal is easily understood. However, the proposed MHI standard has met with strong objections from members representing small rural water utilities.

One such objection is whether or not Median Household Income is the best tool for measuring affordability in the first place. If a decision-maker wants to predict how many customers might have trouble paying their water and wastewater bills, it seems unlikely that much will be learned by studying households in the middle income brackets. Middle and upper income households are the most likely to have the flexibility to modify their spending so that basic utilities are paid. At lower income brackets, however, utility bills makeup a much larger percentage of total household income. In cases where a middle income household may have to make a decision between paying their water and wastewater bill and dining out, a low income household may have to decide between the water and wastewater bill and paying for medical care, food, or heat. Although it is true that some percentage of customers will always have difficulty paying their water and wastewater bills regardless of the rates, no one's interests are served by affordability measurements that obscure the scope of the problem.

Median Household Income Forecast

While there are arguments against using MHI, it is still central to affordability analyses. In this analysis, affordability will be measured in two ways. The first will be a comprehensive financial capability assessment that identifies cost per household, the community financial strength, and the residential burden indicator. The second will be a more straightforward approach as highlighted above of the typical customer bill evaluated as a percentage of MHI. While the second approach is heavily reliant upon MHI, even the first comprehensive assessment approach uses MHI. Therefore, the MHI should be escalated to the applicable year to account for inflation, better reflecting the likely MHI.

According to 2011 US Census data, the MHI for the City of Reading was $27,416. The 2011 MHI was then escalated to 2014 based on the economic conditions since 2011. The MHI is escalated at 1.8% for 2012 and 1.9% for 2013, the annual changes in the Employment Cost Index for the Northeast Region from the Bureau of Labor Statistics. The average of the two years, 1.85%, was used for escalating the MHI for 2014, to $28,966.[10]

For escalation beyond 2014, a different historical index was used to potentially reflect a more accurate change in MHI, while being less impacted by economic activity within only the past few years. The annual MHIs for Pennsylvania for a 20 year period from 1990 to 2010 were gathered from US Census data to calculate an average percent change in MHI. Unfortunately this data was not available for the City of Reading, and therefore, statewide MHI growth was used. The average of the 20 year period was 2.67%, and this value was used to escalate the 2014 MHI to years within the forecast, as shown in Exhibit 3.2.

Exhibit 3.2 -Future MHI for the City

Year	Estimated MHI
2014	$28,966
2015	$29,739
2016	$30,533
2017	$31,349
2018	$32,186
2019	$33,045

C. Affordability Evaluation by Financial Capability Assessment

The Financial Capability Assessment is a ten-step system divided into two phases. RFC completed two alternative financial assessments for the City. The differences between the two analyses are only in Phase I and involve the system costs and the MHI. The approach was designed to incorporate the potential "cost layers" that exist in the utility's forecast. The two analyses include:

1. **Current affordability of the sewer system for FY 2014** – This presents the current level of affordability and includes only a minimal amount of debt service related to Consent Decree projects or other capital projects.

[10] The approach for calculating the 2014 MHI and resulting $28,966 are consistent with the Sewer Rate Study Final Report, November 12, 2013, page 41.

2. **Projected affordability of the sewer system for FY 2019** – This analysis reflects the current state and layers in annualized costs pertaining to projected operating and full debt service costs associated with completing the 6-year CIP.

The information presented below describes each step in detail and the referenced line numbers refer to the numbering system used in the EPA guideline.

Phase One – Customer Rate Burden (The Residential Indicator)

The first step is determining the cost to operate the system per household. The EPA guideline recommends splitting the total annual debt service and operating and maintenance expenses, current and projected, between the number of households in the City's retail service area to approximate the cost each City retail household is responsible for.

The annual debt service and operations and maintenance expenses were taken from the City's financial plan, recently completed as part of the City's Sewer Rate Study. The projected wastewater annual operations and maintenance (O&M) expenses for fiscal year (FY) 2014 are approximately $25.9 million, which includes nearly $5 million in contributions to reserves, and the total debt service cost is projected to be approximately $4.8 million plus $1 million for rate funded City-Only Minor Capital and Infrastructure Renewal. The total of these current costs, $31.7 million, is depicted in Line 102 (Total Current Costs) in Exhibit 3.3 in the first scenario and used to determine the current affordability of the sewer system.

The second scenario presents the projected operating and capital (debt) costs associated with completing the 6-year CIP. Currently, the City is expected to spend $234 million on its CIP to address concerns under the Consent Decree and other projects. The projected wastewater annual operations and maintenance (O&M) expenses for fiscal year (FY) 2014 are approximately $26.7 million, which includes $24.9 million in projected O&M costs and $1.8 million in contributions to reserves. The total debt service cost, which has increased significantly over the 6 years due to the capital needs, is projected to be approximately $18.0 million.

The total costs (line 106) for City residents are determined by combining the current and projected costs for each scenario, less the expected annual revenue recovered from the Bulk Municipal Customers. The revenue from Bulk customers is projected to amount to $10.9 million in 2014 and $18.7 million in 2019. Table 1 shows the adjusted total costs (Line 106).

The City's uses Reading Area Water Authority as its billing provider. Customers are grouped and billed according to meter size, not customer class. However, the City maintains records with customer class designations. The 2013 financial plan used 2011 Customer Account data since that dataset was deemed to be the most recent reliable full year of data. The City recorded 222,661 residential bills in 2011, which when divided by 12 months equals 18,555 residential accounts. This calculation is most likely underestimates the number of residential accounts because it is likely that service started and stopped for more than one residential account throughout the year, but it is used here as a conservative estimate in Line 108.

Line 107 shows the residential share of the total costs. This was calculated by first determining the percent of residential flow to total flow for City customers. Using the 2011 dataset mentioned above,

residential flow accounted for 49% of total flow.[11] That factor was applied to the total costs in Line 106, resulting in the residential share of the totals costs of $10.2 million and $12.8 million in 2014 and 2019, respectively. The total cost per household is presented in Line 109, at $548.12 in Scenario 1 (2014) and $689.01 in Scenario 2 (2019).

Exhibit 3.3: Costs per Household

Line No.			Scenario 1 2014	Scenario 2 2019
	Current Costs			
100	Annual Operations and Maintenance Expenses (Includes Reserve Contributions)		$ 25,890,227	
101	Annual Debt Service (Principal and Interest)		$ 5,761,461	
102	Subtotal		$ 31,651,688	$ 0
	Projected Costs			
103	Estimated Annual Operations and Maintenance Expenses (Includes Reserve Contributions)			$ 26,729,522
104	Annual Debt Service (Principal and Interest)			$ 18,031,606
105	Subtotal		$ 0	$ 44,761,128
106	Total Costs (Excludes revenue from Municipalities as an offset)		$ 20,756,038	$ 26,091,031
107	Residential Share of Total Costs		$ 10,170,459	$ 12,784,605
108	Total Number of Households in Service Area	[No. of Accounts]	18,555	18,555
109	Cost Per Household		$548.12	$689.01

Once the cost per household is determined, a residential indicator score is then calculated. The score is based on the cost per household as a percentage of the service area's MHI. The MHI was discussed in Section B above, and the 2014 and 2019 values were used to determine the residential indicators for each scenario, presented in Exhibit 3.4.

Exhibit 3.4: Residential Indicator

Line No.		Scenario 1 2014	Scenario 2 2019
	Median Household Income		
201	Census Year MHI	$ 27,416	$ 28,966
202	MHI Adjustment Factor	105.65%	114.08%
203	Adjusted MHI	$ 28,966	$ 33,045
204	Annual Cost Per Household	$ 548	$ 689
205	**Residential Indicator Score**	**1.892%**	**2.085%**

Phase Two – Community Financial Strength (Permittee Financial Capability Indicators)

The second phase of the EPA Approach focuses on three general categories of financial capability indicators in an assessment of the community financial strength. The indicators examine the community's debt burden, socioeconomic conditions, and financial operations. Because the Sewer Fund

[11] It should be noted higher occupancy parcels served by a single meter may not be included in the calculation and therefore could potentially impact the calculated cost per household.

is beginning to segregate itself from the City's General Fund, the Sewer Fund has not fully established certain financial metrics as a stand-alone. Therefore, the City's position has been used as a proxy where necessary.

The first Permittee Indicator is the bond rating. The City is planning to issue revenue bonds for the Sewer debt associated with the Sewer CIP. However, these will be the first series of revenue bonds for the City, and at the time of this report, the City has not been rated for revenue bonds. Therefore, for this analysis, the City's rating for general obligation bonds are used as a proxy. The most recent Standard & Poor's bond rating for the City's general obligation bonds (Line 302) was AA-; this rating was given on January 12, 2012. This rating is considered strong.

The net system debt as a percent of full market property value (FMV) measures the debt burden on residents and the ability of the City to issue additional debt. The debt included in the calculation "excludes general obligation bonds that are payable from some dedicated user fees or specific revenue source other than the general tax revenues" (EPA, p 24). Taken from the FY 2012 Comprehensive Annual Financial Report for the City of Reading (CAFR), the total general obligation debt outstanding is $156.8 million (Line 403). From the same report, the FMV of real property in 2012 was $1.43 billion (Line 404). The resulting indicator is 10.97%; any value above 5.0% is considered weak.

Unemployment rates are used to assess the general well-being of residential users in the System's service area. According to the Reading Eagle newspaper, the City of Reading had an unemployment rate of approximately 10% in October 2013; the national average at that time was 7.3%.[12] The difference of in comparison to the national average is used as an indicator.

The next Indicator compares the City's MHI relative to the National average to analyze a community's earning capacity. The National MHI for 2012 was $51,371. The difference in the National and City MHI ($28,966) is 43.61%; since the City's MHI is a difference of more than 25%, it is considered weak.

The City's financial management ability is determined by the property tax revenues as a percent of the FMV. The same full market value used to determine the debt burden is used here. Ad Valorem taxes collected in 2012 were $18.5 million. This amount was also taken from the CAFR. The tax revenue equates to 1.30% of the full market value. Any indicators that are less than 2% are considered strong.

The tax collection rate is used as an indicator of tax collection efficiency. The City's 2012 CAFR indicated that 91.90% of all taxes levied were collected. A collection rate less than 94% is considered a weak indicator.

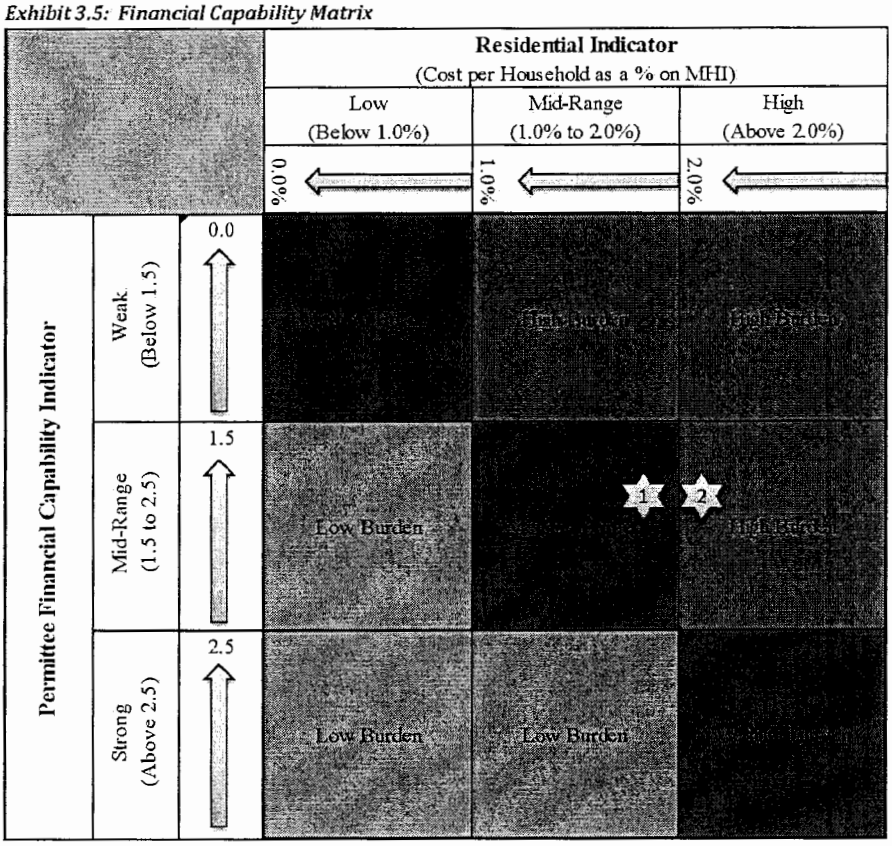
To arrive at an overall Permittee Financial Capability Indicator, we combine the six indicators on a common scale. A weak indicator is allocated one point, a mid-range indicator is allocated two points, and a strong indicator is allocated three points. The City of Reading has strong indicators for their bond rating and tax revenue as a percent of FMV. The median household income, net debt as a percent of FMV, and property tax collection rate, all calculate as weak indicators while the unemployment rate is a mid-range indicator. The average of these, and the Permittee Financial Capability Indicator, is 1.8. The community financial strength rating of 1.8 falls solidly within the mid-range indicator level.

[12] http://www2.readingeagle.com/article.aspx?id=521158, December 6, 2013.

Financial Capability Matrix

The Residential Indicator and Permittee Financial Capability Indicator are combined in a matrix to determine the System Financial Capability Assessment. The Residential Indicator from each scenario is plotted according to the horizontal scale and the Community Strength Indicator is plotted on the vertical scale. The outcomes of each scenario are presented in Exhibit 3.5.

Exhibit 3.5: Financial Capability Matrix



Based on the 1997 EPA's Financial Capability Assessment, the City of Reading currently exhibits medium burden affordability impacts in Scenario 1 (2014) that will become high burden throughout the completion of the Consent Decree projects, as shown as Scenario 2 (2019).

D. Affordability Evaluation by Customer Bills and the 2.0% Threshold

The second approach to affordability assessment will be using the straightforward approach proposed by the EPA of comparing the wastewater bill of a typical customer to the area's MHI. "Affordable rates" are suggested as those that result in the typical customer's bill being less than 2.0% of MHI. This 2.0% threshold is by far the most common approach to evaluating affordability in the industry.

For this analysis, the typical customer is expected to have demand of 4,000 gallons per month. This is based on customer data and staff input. The approved rate structure and rates for 2014 and 2015 are used for the analysis for those years. Beyond 2015, the recently completed financial plan for the 2013 Sewer Rate Study recommends annual rate adjustments of 4.0% per year through 2023. This analysis will present the comparison through 2019, as the first assessment used since it marks the completion of the CIP and the full operation and debt service costs associated.

Using the MHIs calculated in Section B, the monthly bills as a percent of MHI are presented in Exhibit 3.6. As shown in the exhibit, at 4,000 gallons of demand and the MHI forecast based on a 2.67% increase per year, the customer's wastewater bill is right around the 2.0% threshold.

Exhibit 3.6: Monthly Bill at 4,000 gallons Compared to MHI

	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019
Average Monthly Bill*	$ 44.80	$ 46.59	$ 48.46	$ 50.39	$ 52.41	$ 54.51
Average Annual Bill	537.60	559.10	581.47	604.73	628.92	654.07
Average MHI**	28,966	29,739	30,533	31,349	32,186	33,045
Bill % of MHI	**1.86%**	**1.88%**	**1.90%**	**1.93%**	**1.95%**	**1.98%**

* Based on annual rates recommended in the 2013 financial plan.
** Based on MHI Annual escalation of 2.67%

Since forecasting the MHI incorporates a level of uncertainly in the analysis, it's likely that the City will experience annual MHIs higher or lower than those forecasted above based on a 2.67% escalation, introduced as the baseline in Task 3-B. Therefore, a sensitivity analysis is a good exercise to show how uncertainty in a variable can impact study results. For example, higher and lower escalation rates (based on 2.67%) were incorporated into the analysis to show the resulting impact on the customer bill percent MHI calculation. Exhibit 3.7 shows what the impact might be if that escalation is different than projected, due to a higher or lower escalation rate.

Exhibit 3.7: MHI Escalation Sensitivity Analysis

MHI Annual Escalation	Bill Percent of MHI					
	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019
1.75%	1.86%	1.90%	1.94%	1.98%	2.03%	2.07%
2.00%	1.86%	1.89%	1.93%	1.97%	2.01%	2.05%
2.25%	1.86%	1.89%	1.92%	1.95%	1.99%	2.02%
2.50%	1.86%	1.88%	1.91%	1.94%	1.97%	2.00%
2.67%	**1.86%**	**1.88%**	**1.90%**	**1.93%**	**1.95%**	**1.98%**
2.75%	1.86%	1.88%	1.90%	1.92%	1.95%	1.97%
3.00%	1.86%	1.87%	1.89%	1.91%	1.93%	1.95%
3.25%	1.86%	1.87%	1.88%	1.90%	1.91%	1.92%

Impact on Poverty Level Customers

The affordability of the sewer system will have different effects on households of dissimilar income levels. Households that live below the national poverty line ($23,550 for a 4-person household in 2013) will experience a higher burden from rising sewer costs than a family that lives at the MHI or above. The disparity is not as significant in the City's service area due to the level of the City's MHI, but the national poverty line is still approximately 20% below the MHI. According to American Community Survey (ACS) findings, an estimated 37.3% of the City's population is living below the poverty line. Exhibit 3.8 shows the impact on the typical monthly bill at 4,000 gallons at the national poverty line, conservatively escalated at the same rate as the MHI. The table demonstrates that 37.3% of the City's customers will be presented with a burdensome sewer bill upon the completion of the CIP.

Exhibit 3.8: Residential Indicator – Poverty Line Impacts

	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019
Average Monthly Bill*	$ 44.80	$ 46.59	$ 48.46	$ 50.39	$ 52.41	$ 54.51
Average Annual Bill	537.60	559.10	581.47	604.73	628.92	654.07
Average MHI**	23,550	24,179	24,824	25,487	26,168	26,866
Bill % of MHI	**2.28%**	**2.31%**	**2.34%**	**2.37%**	**2.40%**	**2.43%**

E. Summary

"Affordable rates" are a growing concern in the industry today. There have been several approaches suggested to calculate whether rates are affordable. Two of the most common are presented in this analysis, with the 2.0% threshold being by far the most common and popular among utilities.[13] However, no one single approach has been supported by all, and that's because there are so many factors that can play an important role in determining whether a water or sewer bill is "affordable."

[13] US EPA has stated that there are other factors that may indicate the use of a threshold other than 2.0%, but the majority of the industry continues to use 2.0%.

In both of the approaches above, the City has rates that are bordering the 2.0% threshold, the line between medium burden and high burden. Depending on whether MHI is escalated at one rate or another or whether typical customer demand is higher or lower than 4,000 gallons per month, the affordability of rates could be above or below the threshold.

Affordability is an issue with the City. It is evident in the level of the MHI and in the level of population living below the poverty line. It appears rates are and will continue to be right at the threshold of what the industry currently calls "affordable." This is something the City should continue to monitor and consider when making decisions regarding rates. Additionally, should the CIP increase, O&M costs increase more than expected, or revenue comes in lower due to lower demand or less customer accounts, the City will be faced with affordability concerns in their rates. Based on customer affordability, the City may need to consider renegotiation of the Consent Decree schedule if possible.

Task 4. Comparison of Affordability Analyses

A. Overview

In recent years, the City of Reading (City) has faced significant capital improvement costs, largely as a result of a Consent Decree. Concerned about the impact the capital spending would have on City customers, the City engaged Black & Veatch in 2010 to conduct an Affordability Study (2010 Study) that specifically looked at the expenses, capital financing costs, estimated revenues, and resulting burden on City customers. The 2010 study serves as Appendix A. In 2013, the City engaged Raftelis Financial Consultants, Inc. (RFC) to conduct a comprehensive rate study to establish a new sewer rate structure and sewer rates. Nearing the completion of the Rate Study, the City engaged RFC to conduct their own affordability study (2013 Study) based on the results of the Rate Study. The 2013 Study included an updated look at the estimated expenses, revenues, and resulting burden on City customers, and is presented as Task 3 above.

The results of the two affordability analyses are different. The 2010 Study concludes by stating that if the capital costs could be lowered from $478 million to approximately $231 million through the forecast window of 2015, the financial burden would be within the EPA's affordability threshold. With an updated CIP of $234 million and a forecast through 2019, the 2013 Study concludes that the financial burden will be borderline to the EPA's affordability threshold. While it appears the two studies are in relative agreement, this Task identifies the several differences among the two studies, such as different assumptions, costs, and estimated revenue, and explains the impact on the affordability results.

B. Financial Plan

Revenue Requirements

For the affordability analyses of the City's wastewater utility rates, revenue requirements are discussed in two main buckets: operating expenses and capital expenses. These revenue requirements are inclusive of the costs associated with providing wastewater service to not only the City's retail customers but also its municipal, or bulk, customers: thirteen communities that send their respective flows to the City for treatment.

The following subsections will present the contrasting detail behind the two revenue requirement components.

Operating Expenses

The City's wastewater operating expenses were forecasted differently under each approach. The O&M expenses are shown below in Exhibit 4.1. The 2010 Study assumes a significant increase in 2013, which according to the report, was the result of a new treatment plant to become operational. This plant was never realized, but the O&M expenses did continue to increase, as shown for 2013 in the 2013 Study. The 2013 Study used the 2013 budget as the baseline, and includes modest annual inflation, with the exception of 2018 where a little higher increase in O&M expenses are incorporated to reflect higher electricity costs for advanced treatment coming online. Still, the 2013 Study does not reach within the

forecast the 2015 level of O&M revenue requirements in the 2010 Study. This would indicate that the 2010 Study is forecasting higher needs, which would ultimately translate into higher rates.

Exhibit 4.1 – Wastewater Operating Expenses

Year	2010 Study		2013 Study	
	O&M Expense	Annual Δ	O&M Expense	Annual Δ
2009	$16,227,000			
2010	$15,872,000	-2.2%		
2011	$16,592,000	4.5%		
2012	$17,064,000	2.8%		
2013	$23,913,000	40.1%	$20,461,055	
2014	$24,355,000	1.8%	$20,914,081	2.2%
2015	$27,263,000	11.9%	$21,471,304	2.7%
2016			$22,045,243	2.7%
2017			$22,734,926	3.1%
2018			$24,162,571	6.3%
2019			$24,926,361	3.2%

Capital Expenses

Capital expenses typically consist of expenses that do not occur on an annual basis. The City has higher than typical capital expenditures on the horizon due to completing final tasks to fulfill Consent Decree mandates. There are two main components of the City's CIP: Collection System related capital costs and Wastewater Treatment Plant (WWTP) related capital costs. In total, the City's CIP for the 2013 Study is approximately $234.8 million from 2013 through 2019. For the 2010 Study, the City's CIP was projected as high as approximately $478 million. The financing of this discrepancy led to significantly different annual new debt service payments.

Capital Funding Plan and Annual Debt Service

The primary funding mechanism to be used by the City is issuance of debt. The City is expecting to issue long-term debt for capital expenditures to be repaid with interest over a particular period. Moving forward, the City has decided that the Sewer Fund should turn to Revenue Bonds as the primary funding mechanism.

Debt service is the principal and interest payments that the City makes to the holders of the bonds issued to fund the City's capital program. Currently, the Fund's debt service obligations are nearly $3 million per year. In the 2010 Study, the existing debt service in 2009 was nearly $5 million per year. Due to the discrepancy in CIP projected costs mentioned above, the annual debt service in the 2010 Study increased to approximately $33 million by 2015. However, in the 2013 Study, the annual debt service increased to $18 million by 2019. While this is still a significant increase in the annual debt service, the disparity between the studies is obvious.

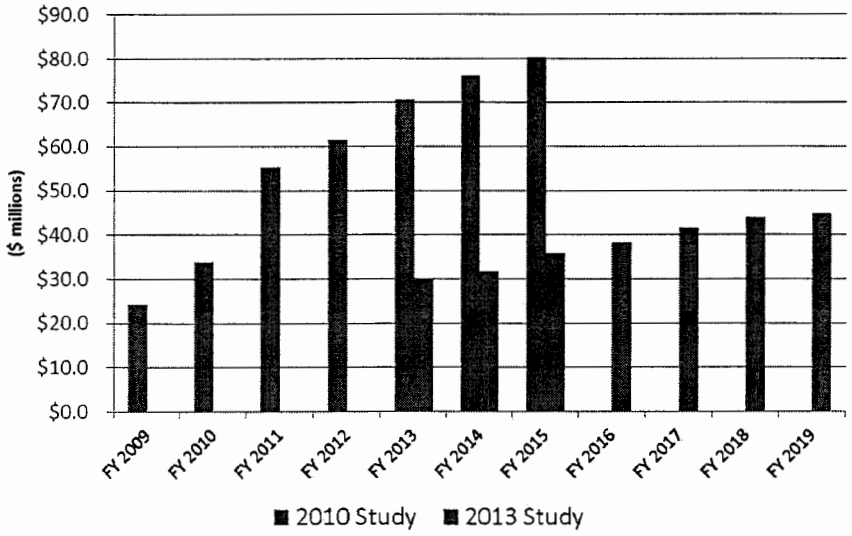
Contributions

The contribution or transfer to the construction fund is yet another dissimilar financial factor. The 2010 Study factors in transfers to the construction fund reaching as high as $16 million per year for cash financing whereas the 2013 Study incorporates a transfer of $2 million per year for an Infrastructure Contingency Fund. This discrepancy in both purpose and annual amount results in lower revenue requirements under the 2013 Study.

Total (Gross) Revenue Requirements

The total (gross) revenue requirements from the main components described above are presented in Exhibit 4.2. It is evident in the graphic that the 2010 Study was projecting the total revenue requirements to increase much more rapidly than the 2013 Study. The 2013 Study was based on the most recent data, and therefore, it appears the 2010 Study may have overestimated the revenue requirements in the 2010 forecast.

Exhibit 4.2 – Wastewater Total Revenue Requirements



Revenue

Recovering an appropriate level of revenue requirements through rates and charges ensures a utility's financial sufficiency and ability to provide safe and reliable services. The City recovers revenue from two primary sources, revenue from City rates to City customers and revenue from bulk municipal customers. Since financial plans for public utilities are used to develop rates at the level to recover just enough to cover expenses, the gross revenue requirements for the 2010 Study shown above have a significant impact on the level of revenue recovered in the 2010 Study. Since revenue requirements were updated and ultimately reduced in the 2013 Study, less revenue is forecasted from both of the

aforementioned sources of revenue. The following presents each of revenue components for the two studies.

Units of Service

The studies were conducted three years apart, and therefore use different customer and demand datasets as the foundation for the forecasts. As one would suspect, the studies differ on both the number of customers served and the annual level of demand. However, one assumption the two studies have in common is the assumption of zero growth. Both studies keep their respective number of customers and levels of demand constant throughout the forecasts.

The customers and demand are not likely to result in one study having significantly higher revenue than the other due to number of customers and level of demand. In fact, these factors are likely to have a cancelling effect since the projected number of customers is higher in the 2010 Study, and the level of demand is higher in the 2013 Study. The differences are not so material that would likely be the cause of such differing affordability results.

Bulk Revenue

The second largest source of revenue for the City is from rates and charges to the municipalities that exist as wholesale or bulk customers. The charges for the municipalities are based on an intermunicipal agreement (IMA). A new IMA has recently been negotiated, and the City is currently working to transition all the communities from the old IMA to the new IMA. Since deriving rates for the municipalities was not part of this Study, the revenue from the bulk customers is used to offset the gross revenue requirements.

Revenue is projected for both studies based on the proposed or new IMA. For the 2013 Study, revenue from Bulk customers is forecasted to range from $9.7 million in 2013 to $18.7 million in 2019. The 2010 analysis had a significantly higher forecast of Bulk customer revenue due to the high revenue requirements. The 2010 Study included a forecast of Bulk revenue that ranged from $9.8 million in 2009 to $36.2 million in 2015.

Retail Revenue

The largest revenue source for the City is revenue recovered from City customers via retail rates for sewer collection and treatment. The 2010 Study determined that two separate rate increases, one in 2010 and one in 2013 would be necessary to cover revenue requirements. The rate increases were 111% and 28%, respectively for 2010 and 2013.

Since the 2013 Study was completed after the 2013 Sewer Rate Study, the plan was not just to meet revenue requirements, but provide a rate plan that was palatable for customers. The 2013 Sewer Rate Study developed a rate plan using rate smoothing that results in 4% per year beginning in 2014 and through the end of the 2019 forecast. Still the primary driver for this revenue discrepancy is not revenue recovery, but the requirement to implement such high rates in the 2010 Study.

C. Affordability Analysis

Because the revenue requirements and resulting rates among the two studies are substantially dissimilar, comparing the affordability analysis results seemingly yields little benefit. This is apparent when observing the results side-by-side in Exhibit 4.3. Yet understanding why the results are different, as expressed above is important in comprehending how various assumptions can dramatically change the analysis and influence the outcome. Still, there is one difference worth noting in the results presented in Exhibit 4.3, and that involves the forecast of median household income (MHI), explained in greater detail below.

Exhibit 4.3 – Comparison of Affordability Analysis Results

	2010 Study			2013 Study		
	Customer Bill	Estimated MHI	% of MHI	Customer Bill	Estimated MHI	% of MHI
2010	$953	$30,157	3.16%			
2011	$953	$31,152	3.06%			
2012	$953	$32,180	2.96%			
2013	$1,200	$33,242	3.61%			
2014	$1,200	$34,339	3.50%	$538	$28,966	1.86%
2015	$1,200	$35,472	3.38%	$559	$29,739	1.88%
2016				$581	$30,533	1.90%
2017				$605	$31,349	1.93%
2018				$629	$32,186	1.95%
2019				$654	$33,045	1.98%

Median Household Income

The forecast of the City's median household income (MHI) was used in both studies. MHI is incorporated in the affordability analysis and the level of the MHI significantly impacts the affordability calculation. Even though the 2010 Study was conducted three years earlier, the 2010 MHI used in the analysis is approximately $1,200 more than the projected 2014 MHI in the 2013 Study.[14] Additionally, the studies used different escalation rates to forecast future MHIs. The 2010 Study used 3.3% compared to the 2013 Study where 2.67% was used. Therefore, the MHI forecasts look very different, and the forecasts impact the typical customer percent bill calculation where the typical customer's bill is calculated as a percent of the City's MHI. In practice, if the monthly bills were the same under the two approaches (which they are not), the percent of MHI would be less when calculated using a higher MHI.

D. Summary

While the two affordability analyses ended up with very dissimilar results largely due to the very different levels of CIP costs, the 2010 Study suggested that if the CIP was $231 million, the City could maintain "affordable" rates. The City's CIP for the 2013 Study is $234 million, and it appears the City's rates are bordering the affordability threshold, thus confirming the 2010 Study's conjecture. Still, the

[14] It should be noted that the 2013 Study benefits from 3 years of additional data, and thus the starting point for the 2013 Study is more accurate of the current situation.

two studies use very different assumptions, project costs and revenue at significantly different levels, and based capital funding on two contrasting CIPs. The 2013 Study provides a more accurate outlook on the current situation the utility is facing, and as presented in Task 3, the 2013 Study provides supporting computations behind the updated affordability results.

Task 5. Alternative Financial and Rate Plan

A. Objective

The 2013 financial plan and the results of the affordability analysis use the CIP and corresponding debt issuances of $213.4 million as the basis for the plan and computations. The results, especially in Task 3, show the change in the typical customer's bill as a percentage of median household income as costs increase. However, what if the City's objective was to stay within the 2.0% affordability threshold and accomplishing this by modifying only the debt issues? In other words, all expenses and financial plan assumptions would remain the same, but the total amount financed, currently at $213.4 million could be increased or decreased to meet affordability standards. The goal of this task is to demonstrate the impact on the amount financed, ultimately the CIP, if the City were to set rates to stay at the 2.0% threshold.

B. 2013 Financial and Rate Plan Review

The 2013 Financial Plan proposed funding the Sewer CIP with revenue bond financing totaling $213.4 million, presented in Exhibit 5.1. The specifics of the debt issuances, such as interest rate and repayment schedule, have been developed by Financial S&Lutions LLC, and are proposed to pay for the majority of a $234 million CIP. The financial plan includes the proposed annual debt service payments as result of these issues. In the affordability study presented in Task 3, customer financial capability was evaluated in year 2019 because this is the last year of the CIP and the full annual payments for each of the bond issues are included in the annual costs at that time.

Exhibit 5.1 – Proposed Debt Issues and Schedule

Timing of Bonds	Bond Amounts
FY 2014	$42.5 million
FY 2015	$105.6 million
FY 2017	$65.3 million
Total	**$213.4 million**

To pay for the costs associated with these bond sales and operating and maintenance costs, the City is advised to implement rate adjustments of 4% per year after 2014, when the new rate structure is adopted and implemented. These rate increases, along with strategically using a Rate Stabilization Reserve, satisfy annual revenue requirements in every year of the financial plan forecast, including 2019.

C. Review of Affordability Assessment

The results of the affordability analysis showed that the City's customer financial capability in 2019 was borderline on the EPA's 2.0% affordability, or high burden, threshold. This is reviewed in Exhibits 5.2 and 5.3 below.

Exhibit 5.2: Financial Capability by Calculating Residential Indicator

Line No.		Scenario 1 2014	Scenario 2 2019
	Median Household Income		
201	Census Year MHI	$ 27,416	$ 28,966
202	MHI Adjustment Factor	105.65%	114.08%
203	Adjusted MHI	$ 28,966	$ 33,045
204	Annual Cost Per Household	$ 548	$ 689
205	**Residential Indicator Score**	**1.892%**	**2.085%**

Exhibit 5.3: Financial Capability by Calculating Percentage of Customer Bill to MHI

	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019
Average Monthly Bill*	$ 44.80	$ 46.59	$ 48.46	$ 50.39	$ 52.41	$ 54.51
Average Annual Bill	537.60	559.10	581.47	604.73	628.92	654.07
Average MHI**	28,966	29,739	30,533	31,349	32,186	33,045
Bill % of MHI	**1.86%**	**1.88%**	**1.90%**	**1.93%**	**1.95%**	**1.98%**

* Based on annual rates recommended in the 2013 financial plan.

** Based on MHI Annual escalation of 2.67%, introduced as the baseline escalation rate in Task 3-B.

The financial capabilities for 2019 in Exhibits 5.2 and 5.3 are generated using the baseline annual MHI escalation rate of 2.67%, established in Task 3-B. Further discussion in Task 3 suggested that the affordability calculations were highly dependent on the level or value of MHI in the given year. For example, if MHI was escalated at different inflation rates, the financial capability, calculated according to the approach in Exhibit 5.3, would vary. A sensitivity analysis, which shows how uncertainty in a calculation impacts results, was prepared to evaluate this, and is shown for year 2019 of the financial plan in Exhibit 5.4.

Exhibit 5.4: MHI Escalation Sensitivity Analysis

MHI Annual Escalation	Bill Percent of MHI in 2019
1.75%	2.07%
2.00%	2.05%
2.25%	2.02%
2.50%	2.00%
2.67%	**1.98%**
2.75%	1.97%
3.00%	1.95%
3.75%	1.92%

Another variable that can dramatically impact this calculation is the assigned level of demand of the typical customer. In the analysis in Task 3, 4,000 gallons was used as the representative level of monthly

demand for the typical customer. If this level was higher or lower, the affordability calculation would produce different results.

The variability of these two key inputs will be taken into consideration when evaluating the rate adjustments and level of financing. Sensitivity analyses will be prepared which test how the results will change based on variability of these two key inputs. Just as presented in Exhibit 5.4 above, this type of analysis is more meaningful when presented over a range of plausible possibilities to better understand the dynamics and implications of these variables.

D. Level of Capital Financing Analysis

RFC used the financial planning model from the 2013 Sewer Rate Study as the basis for this analysis. All assumptions were held constant in the model, with the exception of rate adjustments and level of financing. The EPA threshold for sewer service of 2.0% of MHI was used as a ceiling for determining rate adjustments. Additionally, this analysis, similarly to the Affordability Assessment, examines the customer financial capability and annual costs and expenses in year 2019 because this is the last year of the CIP and the full annual payments for each of the bond issues are included in the annual costs at that time. Below provides the results of the analysis as functions of MHI and level of customer demand, as introduced in Section C.

Capital Financing as a Function of MHI

The sensitivity analysis results of the rate adjustments and subsequent level of capital financing as a result of different median household incomes are presented in Exhibit 5.5. A level of monthly demand of 4,000 gallons for a typical customer was used in the affordability calculations.

From the Table, by varying the annual escalation factor from 1.75% to 3.25% for the projection of MHI, the difference in financing is approximately $51.0 million. This allows the reader to see how much additional financing the City could afford while implementing rates that remain at the threshold of high burden affordability if the City's MHI were increasing higher than expected. Conversely, the reader can see how the level of financing would need to be reduced from $213.4 million if the MHI were increasing at a lower rate than expected.

Exhibit 5.5: 2019 Sensitivity Analysis Based on Varying Levels of MHI

MHI Annual Escalation Factor	1.75%	2.00%	2.25%	2.50%	2.67%	2.75%	3.00%	3.25%
MHI in 2019 as a result of Escalation Factor	$31,591	$31,981	$32,375	$32,772	$33,045	$33,174	$33,579	$33,989
Rate Increase Ceiling to meet 2.0% MHI in 2019[1,2]	3.38%	3.50%	3.78%	4.03%	4.20%	4.28%	4.53%	4.68%
Financing Availability as a Result of Rates (millions)	$189.23	$197.07	$206.18	$214.39	$220.02	$222.68	$231.06	$240.75
2013 Financial Plan Level of Financing for CIP through 2019 (millions)	$213.40	$213.40	$213.40	$213.40	$213.40	$213.40	$213.40	$213.40
Increase/(Decrease) in Financing from Financial Plan (millions)	($24.17)	($16.33)	($7.22)	$0.99	$6.62	$9.28	$17.66	$27.35

1) Rates are presented as the systematic annual rate adjustment for 2015 through 2019.
2) Calculated using 4,000 gallons of monthly demand for a Typical Customer.

Capital Financing as a Function of Typical Customer Monthly Demand

The same sensitivity analysis was repeated, only this time, the level of monthly demand for a typical customer was modified. The median household income for 2019 was held constant at $33,045, determined using the baseline escalation factor of 2.67% established in Task 3-B. The results of the rate adjustments and subsequent level of capital financing as a result of different levels of monthly demand are presented in Exhibit 5.6.

Since the prevailing approach in the industry is to determine affordability by calculating the percent of a typical customer bill of the MHI, it is important to consider how the "typical customer" is defined. This is usually done by determining the level of demand of the typical or average customer. If the level of demand of the typical customer changes over time, so will the affordability percent threshold calculation. This sensitivity analysis was performed in Exhibit 5.6.

Varying the monthly demand for a typical customer from 3,000 to 5,000 gallons produces a significantly greater variance in the level of financing than the MHI analysis. This analysis provides the reader with insight into the degree of funding possible with the implementation of rates that remain at the threshold of high burden affordability.

Exhibit 5.6: 2019 Sensitivity Analysis Based on Varying Levels of Monthly Demand

Level of Monthly Demand for Typical Customer (gallons)	3,000	3,500	4,000	4,500	5,000
Rate Increase Ceiling to meet 2.0% MHI in 2019[1,2]	8.65%	6.30%	4.20%	2.34%	0.65%
Financing Availability as a Result of Rates (millions)	$381.07	$292.67	$220.02	$160.38	$109.83
2013 Financial Plan Level of Financing for CIP through 2019 (millions)	$213.40	$213.40	$213.40	$213.40	$213.40
Increase/(Decrease) in Financing from Financial Plan (millions)	$167.67	$79.27	$6.62	($53.02)	($103.57)

1) Rates are presented as the systematic annual rate adjustment for 2015 through 2019.
2) Calculated using a MHI of $33,045 based on an annual MHI escalation rate of 2.67%.

E. Summary

Determining affordability in future years requires several assumptions. In this analysis, RFC has attempted to show that two variables in particular have significant impact on the affordability calculations and subsequently, the level of rates and financing possible. The goal of this task was to determine what an alternative level of funding would look like based on a modified financial plan and rates. The results in Exhibits 5.5 and 5.6 present several scenarios of how the funding would vary from the $213.4 million in the existing financial plan.

RFC used the financial planning model from the 2013 Sewer Rate Study as the basis for this analysis. All assumptions were held constant in the model, with the exception of rate adjustments and level of financing. The EPA threshold of 2.0% was used as a ceiling for determining rate adjustments. Additionally, this analysis, similarly to the Affordability Assessment, examines the customer financial capability and annual costs and expenses in year 2019 because this is the last year of the CIP and the full annual payments for each of the bond issues are included in the annual costs at that time.

Task 6. Benchmarking Analysis

A. Introduction

Comparing utility rates and performance is a difficult exercise considering the different challenges that face every utility. Benchmarking allows utilities to gather comparative information among other utilities to help them understand how they compare among their peers and to investigate areas of variance that appear suspect, confirm favorable comparisons, or offer opportunities for improvement. By using similar utilities based on "non-rate" information, industry statistics allow decision-makers to evaluate the utility's operation and key financial metrics.

Some of the most common factors influencing the price of water include geographic location, demand during peak periods, customer constituency, level of treatment, level of general fund subsidization, level of grant funding, age of the system, infiltration and inflow levels, and rate-setting methodology. The more of these criteria that are evaluated, the more similar the peer utilities will be. While this can be a useful exercise, it is also important to have a sufficient sample size for comparison.

For the general public (stakeholders), one of their primary concerns related to water and wastewater service is their water and wastewater bills. Therefore, once similar utilities have been identified, it is typically important for a utility to have a thorough understanding of how their rates compare to those of similar, regional, and national peer utilities.

B. Reading Benchmark

The benchmarking comparisons in this analysis present monthly bills for City customers according to the approved 2014 rates. Specifically, the monthly bill is based on the new rate structure and schedule of rates. These rates are assessed differently than the 2013 rate structure.

To provide a more thorough benchmarking analysis, each peer group has been broken into both residential and non-residential bills. By doing this, the analysis provides a means of comparison for the different customer classes against their peers. In order to present the data, it has been broken into sub-groups; first by peer group (local, regional, and national), then by customer class (residential and non-residential). Each chart represents what the monthly bill would be for a customer of each utility with a certain meter (5/8" for residential, 4" for non-residential) and a certain level of demand (4,000 gallons for residential, 200,000 gallons for non-residential). The residential customer's level of demand is selected to represent a typical customer's monthly demand for the City.

Selection of Benchmarked Utilities

The benchmarking exercise was conducted to compare the City's projected rates against peer utilities. Benchmarked utilities were selected through discussions with City staff. One of the keys of this exercise was comparing the rates at the local, regional, and national level as opposed to just one geographical grouping. Reading is much bigger than the other local utilities but they all face the same weather patterns, very similar geographical challenges, and socio economic challenges. Benchmarked utilities at the regional level face these similar challenges, but are also larger utilities with budgets and service

areas more similar to Reading. Expanding the benchmarking analysis to a broader national scale, utilities may be larger than Reading, but many face common challenges of older infrastructure, Consent Decrees, and large CIPs.

Another criterion in selecting the peer utilities was identifying the utilities that have separated sewer and stormwater systems. While the City does not currently have a separate stormwater utility or fees, their infrastructure is separate. Used only at the local level, the sampling include some utilities that are wholesale, or bulk, customers of the system and some that are not.

Local Utilities

The local utilities analysis includes monthly bills from the following Pennsylvania utilities: the Township of Amity, Cumru Township, the Township of Exeter, the Maiden Creek Township Authority, the Muhlenberg Township Authority, and the Township of Spring. Of these local utilities, Cumru, Muhlenberg, and Spring are the three largest bulk customers served by the City.

The residential table below, Exhibit 6.1, shows what a monthly bill would be for a customer at each local utility with a 5/8" meter and using 4,000 gallons. The Non-Residential table below, Exhibit 6.2, shows the bills for a customer of each local utility using a 4" meter and using 200,000 gallons.

Exhibit 6.1: Monthly Residential Rates for Local Utilities

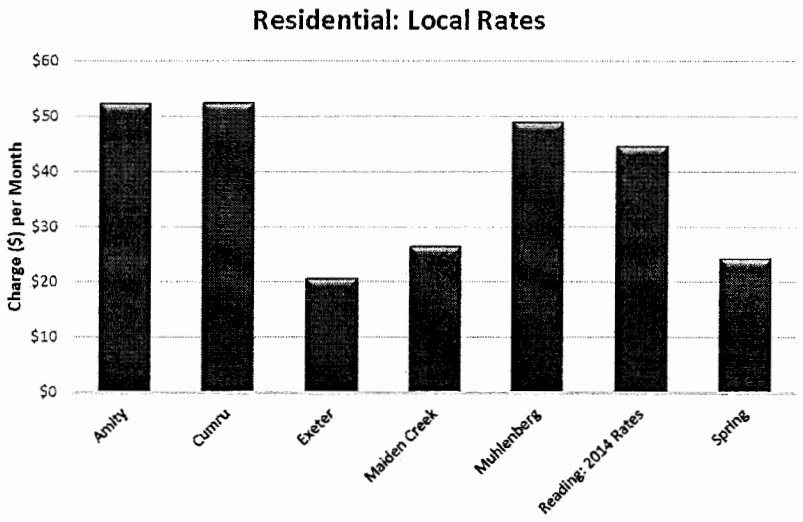
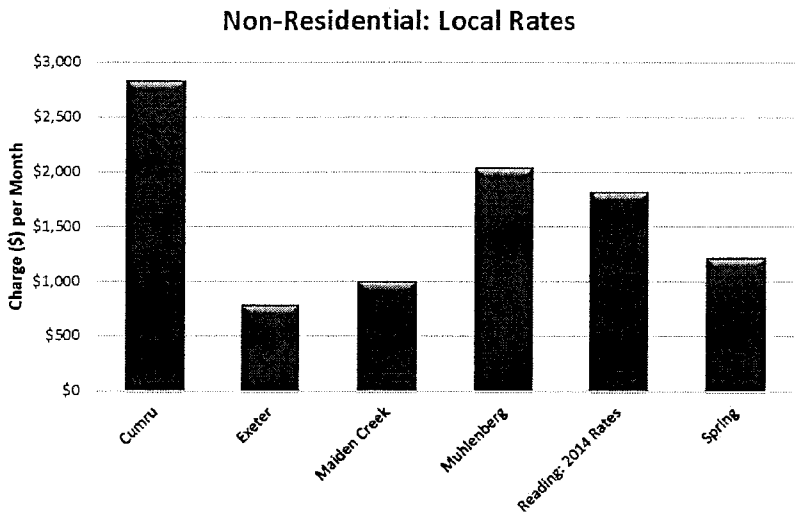


Exhibit 6.2: Monthly Non-Residential Rates for Local Utilities



The Township of Amity does not appear to have an applicable non-residential sewer rate and has therefore been omitted from Exhibit 6.2.

Regional Utilities

The regional utilities analysis includes monthly bills from the following utilities within Pennsylvania: the City of Allentown, the Harrisburg Authority, the City of Lebanon Authority, and the State College Borough Water Authority.

The residential table seen below, Exhibit 6.3, shows what a monthly bill would be for a customer at each regional utility with a 5/8" meter and using 4,000 gallons. The Non-Residential table below, Exhibit 6.4, shows the bills for a customer of each utility regional using a 4" meter and 200,000 gallons per month.

Exhibit 6.3: Monthly Residential Rates for Regional Utilities

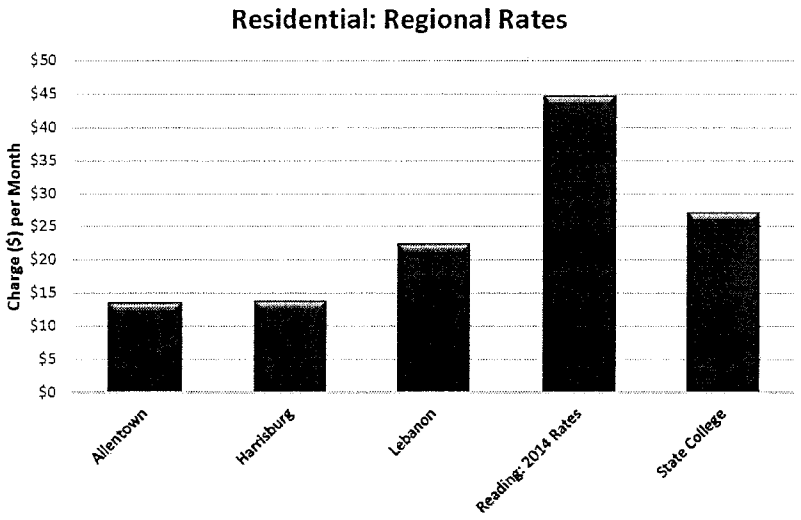
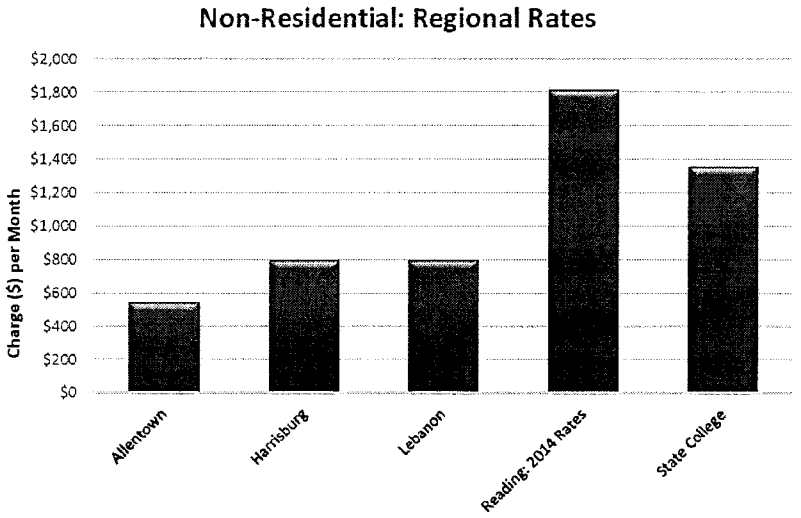


Exhibit 6.4: Monthly Non-Residential Regional Rates

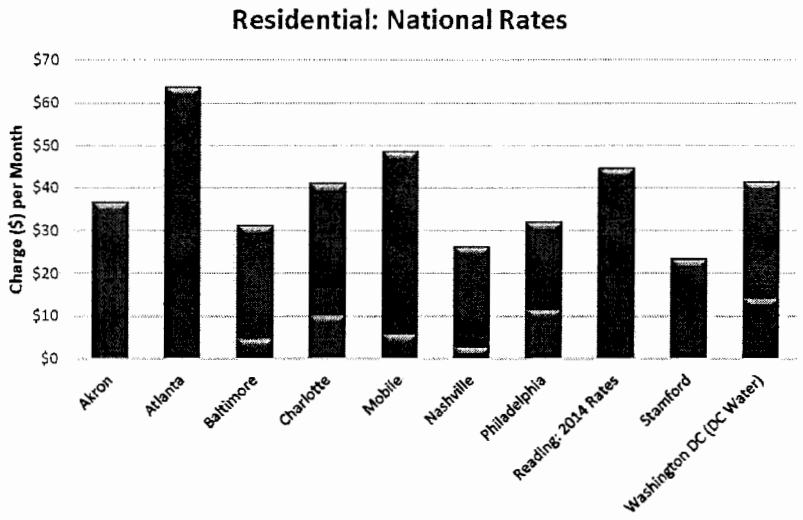


National Utilities

The benchmarking portion for national utilities includes monthly bills from the following major U.S. cities: Akron, Atlanta, Baltimore, Charlotte, Mobile, Nashville, Philadelphia, Stamford, and Washington DC (DC Water).

The residential table seen below, Exhibit 6.5, shows what a monthly bill would be for a customer at each national utility with a 5/8" meter and using 4,000 gallons.

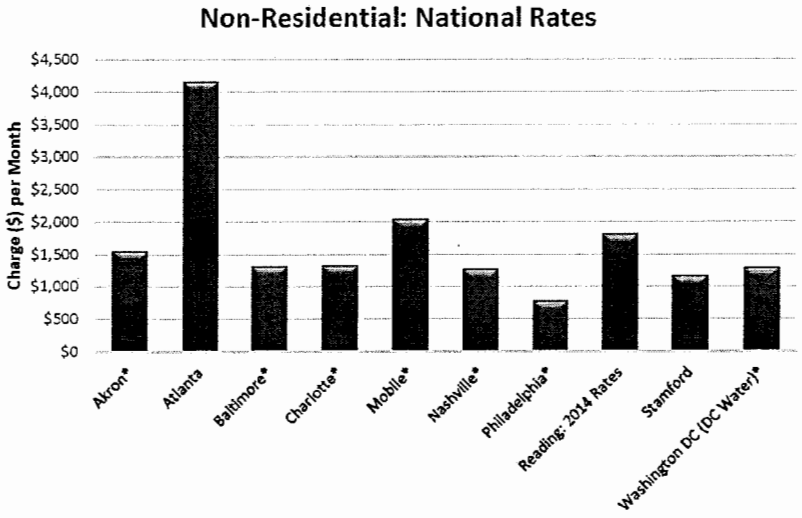
Exhibit 6.5: Monthly Residential Rates for National Utilities



Since Reading's stormwater system is currently funded through the wastewater user charges, the following utilities have been updated to include their respective stormwater fees as well: Akron, Baltimore, Charlotte, Mobile, Nashville, Philadelphia, and Washington DC.

The Non-Residential table below, Exhibit 6.6, shows the bills for a customer of each national utility using a 4" meter and 200,000 gallons per month.

Exhibit 6.6: Monthly Non-Residential Rates for National Utilities



As mentioned before, the utilities that charge a separate stormwater fee have been assigned an asterisk beside the utility name (Akron, Baltimore, Charlotte, Mobile, Nashville, Philadelphia, and Washington DC). While the stormwater fee was included in the residential bill, it has been omitted from the non-residential bill as non-residential stormwater fees are too variant to adequately apply and compare.

C. Summary

The benchmarking analysis presents how the City's monthly bills for representative, or sample, residential and non-residential customers compare with peer utilities. At the designated meter sizes and levels of demand, the City's sewer rates appear to be the highest among the regional comparison and just above the mid-range of the local and national comparisons. RFC provided the City with a benchmarking tool, based in Excel© format that allows the City to explore comparisons at other meter sizes and levels of demand.

Appendix A

Affordability Analysis Final Report

March 2010

BUILDING A WORLD OF DIFFERENCE®

CITY OF READING, PENNSYLVANIA

AFFORDABILITY ANALYSIS
Final Report

March 2010

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March 8, 2010

Ryan P. Hottenstein
Managing Director
City of Reading
815 Washington Street
Reading, PA 19601

Dear Mr. Hottenstein,

In January of 2010, The City of Reading requested Black and Veatch to analyze the financial impact of the Sewer Utility's proposed capital program as it pertains to the Consent Decree and affordability. Attached please find our Report on *A Comprehensive Revenue Requirement and Customer Affordability Analysis* for the City's Sewer Utility.

The results of this analysis indicate that a series of revenue increases totaling 163% are expected to be required from 2010-2015 to help provide proper funding of all City programs, including projects required to address the Consent Decree. The projected revenue increases to City Retail customers are anticipated to result in annual costs for sewerage service that are in excess of 3 percent of MHI throughout the study period.

Because of the magnitude of the capital program moving forward, and the potential impact in individual years that could occur due to changes in the timing of projects, it is recommended that the revenue requirement analysis be evaluated regularly. It is further recommended that a detailed cost allocation and rate design study be completed to ensure that revenue increases are recovered in a fair and equitable manner from all customer classes.

If you have any questions about the findings of this report, please feel free to contact Pam Lemoine (636) 236-8358 or me at (193) 458-3809.

Very truly yours,

BLACK & VEATCH CORPORATION

Peggy L. Howe
Vice President

Enclosure (1)

Black & Veatch Corporation · 11401 Lamar Avenue · Overland Park, KS 66211 USA · Telephone: 913.458.2000

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1.0 INTRODUCTION

The City of Reading (City) owns and operates a 28.5 million gallons per day (MGD) regional wastewater treatment plant and conveyance system, serving the City as well as thirteen additional municipalities surrounding the City. Outside city municipalities are provided service through inter-municipal agreements that outline services provided and fees/charges for such service. The City is currently negotiating an amendment to the inter-municipal agreements.

In December 2004, the City entered into a Consent Decree with the United States Department of Justice (USDOJ) and the United States Environmental Protection Agency (USEPA), requiring the study of and construction of capital improvements necessary to improve the wastewater treatment plant, rehabilitate the collection system, and the industrial pretreatment program. The Consent Decree was signed by the judge on November 7, 2005 (Entry Date). The City submitted the results of an evaluation of the existing plant capacity and treatment alternatives to the regulatory agencies. Upon approval from the agencies, the City moved forward with the development of the development of the capital program required to meet the terms of the Consent Decree.

Costs of operating and maintaining the sewer system, and financing system improvements are met primarily from revenue derived from charges to users. Increased requirements due to new programs associated with the compliance of the Consent Decree, and recognition of inflationary costs associated with day to day operation require more revenue than can be recovered under the schedule of rates in effect as of December 31, 2009. In January of 2010, The City of Reading requested Black and Veatch to analyze the financial impact of the proposed capital program as it pertains to affordability.

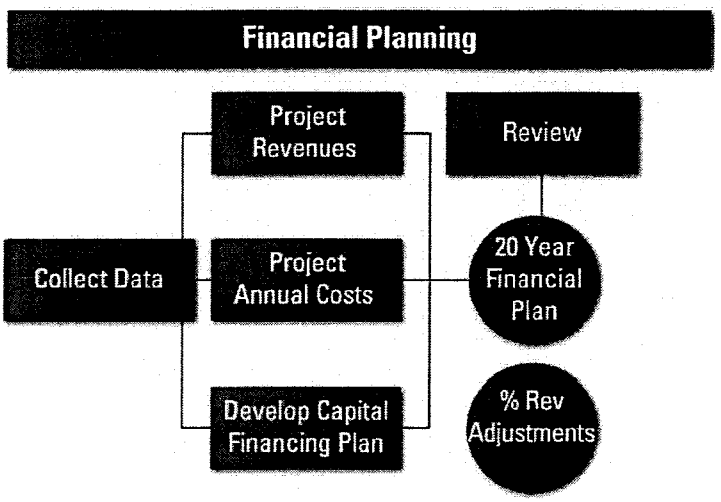
1.1 Purpose

Black & Veatch understands that the primary consideration of this Study is to assist the City with performing a comprehensive revenue requirement and customer affordability study for the City's sewer utility. Key objectives of this Study include:

- Analyze operation and maintenance budgets and capital improvement programs with respect to revenues.
- Review of projects to be financed through revenue bond issues.
- Provide the City staff guidelines for funding infrastructure replacement reserves.
- Forecast estimated revenue and expenses.
- Project estimated impact of capital improvement program on future revenue requirements.
- Develop twenty-year financial plan that projects revenue and expenditures, maintains adequate fund balances, and allows for intermittent rate adjustments.

1.2 Scope

Included in this report are the results of comprehensive studies of projected revenue under existing rates and revenue requirements for sewer service, as indicated in the following flow chart.



The comparison of projected revenue requirements with projected revenue under existing rates is indicative of the degree of adequacy of the overall level of those rates to meet projected costs.

2.0 REVENUE

The revenue for the City's sewer utility to meet costs of sewer service is derived principally from sewerage service charges and excess strength surcharges from inside city customers (retail customers) and sewerage service charges from other municipalities served via inter-municipal agreements. Other revenue sources include industrial waste testing, application and reservation fees, fines, interest and penalties. and other miscellaneous sources. The level of future revenue is projected through an analysis of historical system growth in terms of number of customers, sewer volume, and revenue derived from charges for service, adjusted to reflect current economical conditions.

2.1 Retail Customer Growth

Based on data provided by the City, the City has historically served 23,200 retail customers, Due to the current and anticipated economic condition of the City, the projected number of customers has been held relatively constant at 22, 546 during the study period.

Historical and projected billable wastewater flow volume for the City's retail customers is measured through meters that read in gallons as well as cubic feet. Projected billable volume is based on the most recent year of data available, which was 2008 and assumes that the contributed volume per customer will remain unchanged during the study period. Billable volume for the study period is projected at 1,704,578 thousand gallons and 16,896,000 hundred cubic feet.

2.2 Municipal Customer Growth

In addition to the City's retail customers, the City also provides wholesale wastewater service, including major conveyance and treatment, thirteen municipalities that surround the City of Reading. These municipalities are served through inter-municipal agreements that outline the services provided and the method of determining quarterly costs.

Municipalities are billed on the basis of the total flow delivered to the City's treatment plant. Such flow is converted to equivalent residential units (EDUs), defined as 12,500 gallons per EDU. Table 2-1 summarizes the historical EDUs for each municipality. Based on a review of available historical data and the current economic environment in the region, total EDUs are assumed to remain at current levels.

Table 2-1
Historical Equivalent Residential Units
for Municipalities

Line No.		Actual Adjusted 2008	Estimated Adjusted 2009
1	Antietam Valley Municipal Authority	1,128,000	1,113,760
2	Alsace Township *	-	-
3	Bern Township	2,154,208	1,911,552
4	Cumru Township	37,870,514	34,210,166
5	Kenhorst Borough	5,927,688	4,565,756
6	Laureldale Borough	21,561,280	18,898,320
7	Mohnton Borough	1,287,290	1,351,320
8	Muhlenberg Township	87,952,557	81,843,788
9	Robeson Township	318,651	124,369
10	Shillington Borough *	-	-
11	Spring Township	27,968,899	27,955,733
12	Wyomissing Borough	1,279,020	1,242,813
13	**TOTAL MUNICIPALITIES**	187,448,106	173,015,578

* billed through Cumru

2.3 Wastewater Revenue under Existing Rates

The City derives revenues from City retail customers, municipalities, and miscellaneous revenues. Revenues from City retail customers are based on a schedule of wastewater rates that includes a service charge, a block quantity volume charge, and an extra strength surcharge for excess pollutant customers. Charges are applied monthly and are based on either gallons or cubic feet of water use, depending upon the type of meter. A schedule of rates in effect as of December 31, 2009 is shown in Table 2-2.

5/8" (0.62") meters are billed a monthly service charge and a uniform volume charge based on total water volume. All other meters are charged a service charge and a declining block rate schedule. The Extra Strength Surcharges are applied to specific monitored and tested customers and apply rates per hundred cubic feet for the strength components Biochemical Oxygen Demand (BOD), Suspended Solids (SS) and Total Kjeldahl Nitrogen (TKN), each exceeding 325, 300 and 20 milligrams per liter (mg/l) respectively.

The City's retail customer sewer service revenue is projected by applying the wastewater rate structure to the appropriate projected unit of measure for each meter size. Total projected sewer service revenue, from user rates, is expected to average $15,226,000 for the 2010 to 2015 projection period.

Revenues from extra strength and industrial wastes are projected to contribute an additional $1,137,000 per year to the operating revenues.

Revenues from the municipalities served by the City are calculated based upon a detailed cost allocation and unit rate methodology, as outlined in the inter-municipal agreements. A unit rate is calculated for both Treatment and Transportation services, and are based upon the most recent audited expenses for the utility, generally two years prior (e.g., 2010 rates based on 2008 audited expenditures). For 2010, 2009 unit rates are used for the first quarter of the year. Unit rates recently calculated by the City, and anticipated to become effective April 1, 2010, are used to calculate revenue for the remainder of 2010. For 2011 through the end of the projection period, unit rates are calculated based upon projected expenditures and the conditions outlined in the *proposed* inter-municipal agreement currently being negotiated with the municipalities.

Table 2-2
Existing Rates

Service Charges		
	Meter Size	**$/month**
	0.62"	$7.96
	0.75"	$16.04
	1"	$26.28
	1.25"	$41.16
	1.5"	$47.08
	2"	$77.57
	3"	$151.19
	4"	$187.60
	6"	$370.43
	8"	$922.16
	10"	$1,436.68
Consumption charges		
	0.62" meter	
Per 100 Cu Ft		$4.278
Per 1000 Gallons		$5.729
	0.75" to 10" meters	
Per 100 Cu Ft		
First	100,000 cu ft	$5.267
Next	400,000 cu ft	$4.608
Over	500,000 cu ft	$3.886
Per 1000 Gallons		
First	750,000 Gallons	$7.042
Next	3,000,000 Gallons	$6.159
Over	3,750,000 Gallons	$5.195
Extra Strength Charges		
TSS	Over 325 mg/l	$126.90
BOD	Over 300 mg/l	$116.71
TKN	Over 20 mg/l	$1,281.69

Projected user charge revenues for City retail services, industrial surcharges, and municipalities are summarized in Table 2-3.

Table 2-3
Projected User Charge Revenues under Existing Rates

Line No.	Description	Estimated 2009	Projected 2010	2011	2012	2013	2014	2015
		$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000
	Revenue from Rates:							
1	City Revenue under Existing Rates	14,625	15,226	15,226	15,226	15,226	15,226	15,226
2	Industrial Surcharge	1,137	1,137	1,137	1,137	1,137	1,137	1,137
3	Municipality Revenue	9,844	10,419	20,640	26,739	28,346	31,533	35,816
4	**Total Revenue from Rates**	**25,606**	**26,782**	**37,003**	**43,101**	**44,708**	**47,896**	**52,179**

Other operating and non-operating revenues of the City consist of revenues derived from other fees including reservation fees, interest and penalties, and interest income. Other operating revenue is projected to remain constant at $741,000 for all sources other than interest income, which is calculated based upon average fund balances. Total revenue is projected to range from $841,000 in 2010 to $998,000 in 2015.

3.0 REVENUE REQUIREMENTS

The revenue required to adequately provide for the continued operation of the sewer utility must be sufficient to meet the cash requirements of operation and maintenance (O&M) of the system; principal, interest, and reserve payments on revenue and other bond indebtedness; and recurring annual capital expenditures for replacements, system betterments, and extensions not debt financed.

Operation and maintenance expenses are those expenditures necessary to transport and treat customers' wastes as well as maintain the system in good working order. Capital costs include principal and interest payments, bond covenant-required payments, and the costs of other capital improvements paid directly from annual operating revenues.

3.1 Operation and Maintenance Expense

Table 3-1 presents a summary of estimated and projected O&M expenditures for 2009 through 2015 by operating division. Major cost items for each division generally include personal services and employee fringe benefits; the cost of purchased electric power, gas and other treatment chemicals; and other contractual service and material costs. Expenses have been summarized for the collection system, treatment plant, and miscellaneous/other expenditures in Table 3-1 below.

Table 3-1
Projected Operation and Maintenance Expense

Line No.	Description	Estimated 2009	Projected 2010	2011	2012	2013	2014	2015
		$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000
1	**Sanitary Sewer - 43**	3,578	3,452	3,608	3,714	3,825	3,957	4,095
2	**Sewage Treatment - 44**	10,561	10,224	10,744	11,064	9,874	10,218	11,045
3	**Miscellaneous - 91**	2,088	2,197	2,240	2,285	2,331	2,424	2,520
4	**Other - 00**	-	-	-	-	-	-	-
	Total Base O&M (Existing Operations)	16,227	15,872	16,592	17,064	16,030	16,599	17,659
5	**Additional O&M (New Treatment Plant)**	-	-	-	-	11,248	11,232	13,666
6	**Reduction in O&M**	-	-	-	-	(3,365)	(3,476)	(4,062)
7	**Total Net O&M Expense**	**16,227**	**15,872**	**16,592**	**17,064**	**23,913**	**24,355**	**27,263**

All operation and maintenance expenditures are projected to increase for annual price escalations over 2009 costs. Most operation and maintenance expense elements are assumed to increase at a rate of 3.3 percent per year to recognize the effects of inflation. Benefits are assumed to increase at a rate of 7.5 percent through 2013 to reflect the increasing costs of health care, pension requirements and other benefits. For 2014 and beyond, inflation for benefits is assumed to return to an average inflation rate of 3.3 percent. In addition to inflationary increases in power costs in most years, power costs are assumed to increase 25 percent in 2011 to reflect the anticipated impact of deregulation.

Projected operation and maintenance expenses also include an estimate of increased operating costs due to construction and operation of the new wastewater treatment plant. Phase 1 of the treatment plant is assumed to become operational in 2013. Phase 2 is assumed operational in 2015. Reductions in operating expenses are also projected, reflecting the decommissioning of the existing treatment plant.

As indicated, annual operating and maintenance costs are projected to increase from $15,872,000 in 2010 to $27,263,000 in 2015.

3.2 *Capital Improvement Program*

The City has developed a multi-year capital improvement program (CIP) covering its anticipated commitments for the period from 2010 through 2015. A summary of the capital improvement program, totaling $599,142,000 is shown in Table 3-2. The CIP is based on a drawdown schedule provided by the City's Program Manager, and adjusted to reflect industry standards for monthly expenditures for the individual capital projects. In addition, estimates of additional projects not included in the Program Manager's CIP, including construction management costs, collection system rehabilitation anticipated to be required as a result of studies underway as required by the Consent Decree, and on-going asset management requirements.

Table 3-2
Capital Improvement Program

Line No.	Description	Total Cost	Estimated 2009	Projected 2010	2011	2012	2013	2014	2015	2016-2029
		$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000
1	Upgrades - Construction	321,470	-	28,545	99,749	77,057	50,082	58,660	7,377	-
2	Upgrades - Overhead and Soft Costs	37,219	14,216	6,638	7,165	2,735	2,854	2,878	733	-
3	Other Projects	71,398	3,310	16,899	15,156	11,768	9,172	8,115	4,626	2,352
4	Project Contingency	30,900	-	2,575	6,180	6,180	6,180	6,180	3,605	-
5	Ongoing I/I management	15,060	-	-	-	-	-	5,020	5,020	5,020
6	Asset Management	123,095	-	2,000	4,000	5,000	5,150	5,305	5,464	96,176
7	Total Projected Capital Program	599,142	17,526	56,657	132,250	102,740	73,438	86,158	26,825	103,548

3.2.1 Capital Improvement Program Financing Plan

Annual expenditures for the CIP are anticipated to be met from a combination of available funds on hand, revenue bond proceeds, interest earnings, and transfers from the Operating Fund. Three bond issuances are projected during the study period, as shown in Line 2 of Table 3-3. Bond issuances are calculated as that necessary to fund contracts let during each year of the projection period. Transfers from the Operating Fund are anticipated to total $70,711,000 through 2015 as indicated on Line 3. Interest is earned at the rate of one percent annually on carried balances as indicated on Line 4.

The application of funds shows that $478,068,000 in major capital commitments are projected from 2010 through 2015. Major Capital Improvements, shown on Line 6 of Table 3-3, represent estimated annual expenditures as listed in the capital improvement program, which reflect estimated drawdown of contracts necessary to complete projects in the CIP. In addition to major capital improvements, Lines 17 through 9 summarize costs required due to issuance of long term debt and reflect issuance expenses, reserve fund requirements, and capitalized interest costs.

Table 3-3
Capital Improvement Financing Plan

Line No.	Description	Estimated 2009	Projected 2010	2011	2012	2013	2014	2015
		$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000
	Source of Funds							
1	Beginning of Year Balance	24,932	7,568	186,369	140,533	53,587	79,756	10,530
2	Bond Issuance	-	258,000	79,000	-	93,000	-	-
3	Transfer from/ (to) Construction Fund	-	7,199	15,190	14,827	17,012	16,483	16,841
4	Interest Income	162	965	1,626	966	663	449	55
5	Total Source of Funds	25,094	273,731	282,185	156,327	164,262	96,688	27,426
	Application of Funds							
6	Major Capital Improvements	17,526	56,657	132,250	102,740	73,438	86,158	26,825
7	Bond Issuance Cost	-	2,580	790	-	930	-	-
8	Bond Capitalization Cost	-	9,880	3,025	-	3,562	-	-
9	Transfer to Bond Reserve Fund	-	18,245	5,587	-	6,577	-	-
10	Total Use of Funds	17,526	87,362	141,652	102,740	84,506	86,158	26,825
11	**End of Year Balance**	**7,568**	**186,369**	**140,533**	**53,587**	**79,756**	**10,530**	**601**

3.2.2 Debt Service Requirements

A summary of the City's existing and proposed debt service requirements is shown in Table 3-4. Existing debt service requirements are related to the 2008, 2008B, and 2008 D&E Series revenue bonds.

Debt service requirements on the proposed revenue bond issues required during the study period are based upon equal annual principal and interest payments over a period of 30 years at an estimated net effective interest rate of 5.75 percent. Bonds in each year are assumed to be issued July 1 of each year.

As shown in Table 3-4, $433 million in revenue bonds are projected over the planning period.

Table 4-4
Existing and Projected Long-Term Debt Service

Line No.	Description	Issue Amount	Estimated 2009	Projected 2010	2011	2012	2013	2014	2015
		$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000
1	**Existing Debt**		4,924	5,665	3,147	3,239	2,675	2,673	2,676
	Proposed Revenue Bonds (a)								
2	2009 Series	-	-	-	-	-	-	-	-
3	2010 Series	258,000		1,989	17,018	18,245	18,245	18,245	18,245
4	2011 Series	79,000			609	5,211	5,587	5,587	5,587
5	2012 Series	-				-	-	-	-
6	2013 Series	93,000					717	6,134	6,577
7	2014 Series	-						-	-
8	2015 Series	-							-
9	**Total Revenue Bonds**	430,000	4,924	7,654	20,774	26,695	27,224	32,638	33,084

Notes:
(a) Proposed revenue bond debt service is based upon the issuance of bonds with a 30 year term and interest rate of 5.75 percent per annum.
(b) Proposed low interest debt service is based upon the issuance of debt with a 25 year term and interest rate of 3.5 percent per annum.

3.3 Revenue Requirement Levels

There are three approaches to establishing utility revenue requirements. The first approach identifies the cash requirements of utilities. The second addresses the utilities' financial statements. The third approach addresses covenants that the utilities have made to bond holders, financing agents, or mandated policies in regards to minimum reserve balances. The financial plan presented herein was developed to satisfy annual

revenue requirements based on the cash needs of the utility and to sustain appropriate fund balances and coverage requirements.

The pro forma operation statement or cash flow analysis presented in Table 3-5 provides a basis for evaluation of the adequacy of revenues under existing rates to meet the projected revenue requirements of the City for the period 2010 through 2015. Revenue under existing rates for City Retail customers, as shown in Lines 2 through 4, reflect calculated revenue under rates effective as of December 31, 2009. The indicated increased revenue levels shown on Lines 5 of Table 3-5 are based on the effective dates and magnitude of required revenue adjustments shown in Lines 6 and 7 and considered necessary to meet the revenue requirement obligations of the City as well as required revenue bond coverage provisions. The effective amount of increased revenues shown during the first year of each annual rate adjustment includes an allowance for the effect of bill pro-ration and billing lag on the level of revenues to be received.

Revenues from Municipalities are not projected to be impacted by the projected revenue increases applicable to City Retail customers; as such revenues are calculated and limited to conditions outlined in the inter-municipal agreements. Municipal revenues are shown in Line 8 and comprise the remainder of revenues from rates. Lines 9 through 13 summarize other operating and non-operating revenue available to fund the utility's operating expenses.

Total revenue requirements are summarized on Line 24 of Table 3-5 and include operation and maintenance expenses, principal and interest on outstanding and projected debt, transfer to the General Fund, and transfer to the Construction Fund.

The ending balance/deficit available shown on Line 25 is the projected Operating Reserve end-of-year cash balance from the annual operation of the Utility. Operating reserve requirements are listed on Line 26 and are needed to maintain the mandated three month's expenditures in the Operating Fund as Working Capital. As shown, funds in excess of the recommended Working Capital requirement are transferred to the Construction Fund (Line 23) to provide cash financing of a portion of the capital program.

Presented at the bottom of Table 3-5 is an analysis of the City's ability to provide adequate debt service coverage on revenue bonds and total debt service obligations. The City's outstanding debt is General Obligation debt, and is assumed to require one-times debt coverage. As previously discussed, it is anticipated that future debt will be revenue bond debt, and will require debt service coverage of at least 125 percent. Debt service coverage is defined as system net revenues (total revenue less operation and maintenance expense and general obligation bond debt) divided by total annual debt service. Based on industry experience and current market conditions, debt service coverage policies providing for a coverage level of no less than 150 percent for both annual debt service as well as maximum annual debt service better positions the City for the market. The revenue increases projected in this study reflect the level of funding necessary to recover all annual expenditures and maintain revenue bond debt coverage at a level of 150 percent or higher.

Table 3-5
Estimated Revenues and Revenue Requirements under Increased Rates

Line No.	Description	Estimated 2009	Projected 2010	2011	2012	2013	2014	2015
		$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000
	Revenues:							
1	Beginning Fund Balance	-	2,493	3,914	4,091	4,208	5,427	5,139
	Revenue from Rates:							
2	City Revenue under Existing Rates	14,625	15,226	14,944	14,944	14,944	14,944	14,944
3	Industrial Surcharge	1,137	1,137	1,137	1,137	1,137	1,137	1,137
4	Subtotal	15,762	16,363	16,081	16,081	16,081	16,081	16,081
5	Increased Revenue	-	7,568	17,850	17,850	26,559	27,351	27,351
6	Percent Increase		111%	0%	0%	28%	0%	0%
7	Effective Date		1-Jul	1-Jan	1-Jan	1-Jan	1-Jan	1-Jan
8	Municipality Revenue	9,844	10,419	20,644	26,772	28,310	31,433	36,262
9	Total Revenue from Rates	25,606	34,349	54,575	60,703	70,950	74,865	79,694
10	Sewer Reservation Fee	535	267	267	267	267	267	267
11	Interest & Penalty	345	345	345	345	345	345	345
12	Other Revenue	129	129	129	129	129	129	129
13	Interest Income	27	99	158	190	205	225	250
14	Total Revenues	**26,643**	**35,190**	**55,475**	**61,635**	**71,896**	**75,831**	**80,686**
	Revenue Requirements:							
15	O&M Expenses	16,227	15,872	16,592	17,064	23,913	24,355	27,263
	Debt Service Requirements							
16	Existing G.O. Debt	4,924	5,665	3,147	3,239	2,675	2,673	2,676
	Proposed Future Debt							
17	Proposed Revenue Bonds	-	1,989	17,635	23,522	24,634	30,168	30,620
18	Less Interest from Reserve Fund	-	(92)	(212)	(240)	(274)	(308)	(308)
19	Low Interest Loans	-	-	-	-	-	-	-
20	Total New Debt Obligation	-	1,897	17,423	23,281	24,361	29,861	30,312
21	Total Debt Service	4,924	7,562	20,570	26,521	27,036	32,533	32,988
22	Transfer to General Fund	3,000	3,000	3,000	3,000	3,000	3,000	3,000
23	Transfer to Construction Fund	-	7,335	15,136	14,934	16,728	16,231	16,928
24	Total Revenue Requirements	**24,150**	**33,769**	**55,298**	**61,519**	**70,677**	**76,119**	**80,180**
25	End of Year Balance	**2,493**	**3,914**	**4,091**	**4,208**	**5,427**	**5,139**	**5,645**
26	Minimum Required Operating Balance	**4,001**	**3,914**	**4,091**	**4,208**	**5,896**	**6,005**	**6,722**
	Debt Service Coverage for:							
27	**Revenue Bonds - Current Year**	**0%**	**720%**	**205%**	**178%**	**186%**	**163%**	**167%**
28	**Revenue Bonds - Maximum P&I**	**0%**	**75%**	**150%**	**173%**	**148%**	**159%**	**166%**
29	*Minimum Required*	*125%*	*125%*	*125%*	*125%*	*125%*	*125%*	*125%*
30	*Utility Policy*	***150%***	***150%***	***150%***	***150%***	***150%***	***150%***	***150%***

As shown in Figure 3-1, capital related costs (debt service and cash-financed capital) are estimated to increase from approximately 45 percent of total costs in 2010 to nearly 65 percent of total costs in 2015.

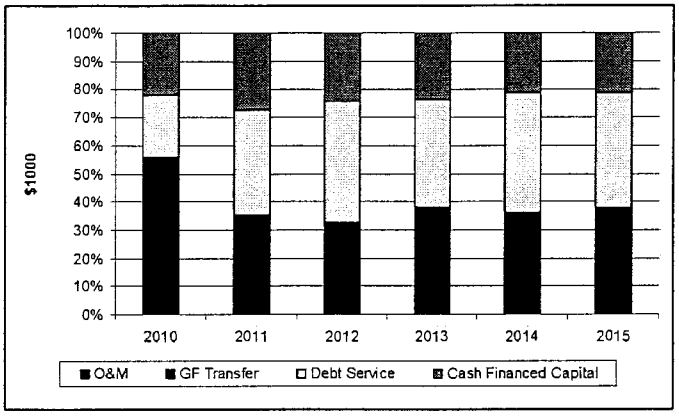


Figure 3-1
Breakdown of Annual Revenue Requirements

Over the planning period, the total revenue requirements of the Utility are expected to increase substantially due to the implementation of the capital program. As shown in Figure 3-2, operation and maintenance expenses are projected to increase in 2013 upon commissioning of the new wastewater treatment plant. However, total costs are impacted most dramatically by the increase in capital-related costs.

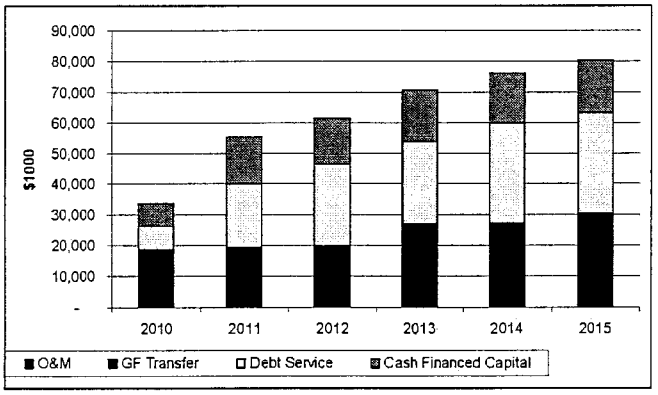


Figure 3-2
Summary of Annual Revenue Requirements

3.4 Affordability Analysis

EPA, in its guidance to utilities, defines affordability in terms of a percentage of median household income (MHI). The affordability limit based on this percentage, referred to as the Residential Indicator (RI), varies depending upon the health of the City. For moderately burdened cities, the affordability limit is 2 percent. For heavily burdened cities, the limit is identified as 1.6 percent. While this study did not include an analysis of the City for the purposes of identifying the level of burden the City is under, it is assumed, based on knowledge of the City, that the City would likely be defined as heavily burdened. Under existing rates in effect during 2009, the City's RI is estimated to be 1.51 percent and is based upon the average monthly volume of a 5/8 inch meter as determined through analysis of actual billing data. Table 3-6 illustrates the impact of the revenue increases that are projected to be necessary. As shown, the projected revenue increases to City Retail customers are anticipated to result in annual costs for sewerage service that are in excess of 3 percent of MHI throughout the study period.

Table 3-6
Comparison of Projected Typical Residential Costs with Median Household Income

Description	2010	2011	2012	2013	2014	2015
Median Household Income	$30,157	$31,152	$32,180	$33,242	$34,339	$35,472
Annual Bill Proposed Rate	$ 953	$ 953	$ 953	$ 1,200	$ 1,200	$ 1,200
Residential Indicator *	3.16%	3.06%	2.96%	3.61%	3.50%	3.38%

* Annual bill divided by median household income.

While EPA evaluates affordability based upon the median household income for the entire City, it is important to understand the impact on low income families. Such families are more heavily impacted by sewer revenue increases and are at greater risk of becoming delinquent in payments. Increases in delinquencies reduces revenue recovery for the Utility, and thus would require further revenue increases to recover remaining costs.

The City of Reading is estimated to have 34 percent of residents living at or below the poverty rate of $21,834 per year. As shown in Table 3-7, the impact of increased sewer bills impacts such customers at a much higher rate than the average household. As shown, projected sewer bills are projected to reach 6.5 percent the take home pay of a low-income household earning $21,834 per year.

Table 3-7
Comparison of Projected Typical Residential Costs with Median Household Income

Description	2010	2011	2012	2013	2014	2015
	$	$	$	$	$	$
Monthly Take Home Pay	1,547	1,547	1,547	1,547	1,547	1,547
Monthly Bill Existing Rates	38	38	38	38	38	38
Monthly Bill Proposed Rate	79	79	79	100	100	100
Monthly Bill as % of Takehome Pay	5.1%	5.1%	5.1%	6.5%	6.5%	6.5%

4.0 CONCLUSION

As previously discussed, the estimated capital improvement program will result in revenue increases that will severely impact customers and is likely to result in financial distress for the utility. As a result, Black & Veatch evaluated the potential range of capital expenditures that could possibly be accomplished while keeping City retail customer rates at approximately 2.0 percent of median household income. Table 4-1 summarizes the level of funding that could be possible, given the assumptions outlined in this report.

Table 4-1
Approximate Capital Spending at 2.0 Percent of MHI

Description	2010	2011	2012	2013	2014	2015
	$000	$000	$000	$000	$000	$000
Revenue Increase	32.00%	3.30%	3.30%	3.30%	3.30%	3.30%
Revenue Bond Issuance Amount	206,000	-	30,000	-	27,000	-
Amount Available for Capital Spending	181,000	-	26,000	-	24,000	-

As shown, approximately $231 million in capital funding is estimated to be possible during the study period with rates that are approximately 2.0 percent of median household income.

The results of this analysis indicate that a series of revenue increases are expected to be required from 2010-2015 to help provide proper funding of all City programs. The key driver of required revenue increases is the implementation of the capital program required by the Consent Decree and increased funding for the ongoing refurbishment of the Utility.

Because of the magnitude of the capital program moving forward, and the potential impact in individual years that could occur due to changes in the timing of projects, it is recommended that the revenue requirement analysis be evaluated regularly. It is further recommended that a detailed cost allocation and rate design study be completed to ensure that revenue increases are recovered in a fair and equitable manner from all customer classes.

Hazen & Sawyer
City of Reading Collection Systems Engineering Support

Notice to Proceed dated October 15, 2013.

Primary efforts during this time period included the following activities:

Task 1 - Hydraulic Modeling and Capacity Evaluation

- Project Kick-off meeting was held on October 22, 2013.
- Developed and calibrated a functional InfoWorks hydraulic model to 2005 dry weather flow.
- Hydraulic model progress meeting was held on November 4, 203.
- Submitted Sewer System Model Development and Dry Weather Calibration Technical Memorandum on November 15, 2013.
- Submitted Final hydraulic modeling report on December 11, 2013 including a response to comments summary log.
- Meetings, teleconferences and coordination with the City occurred throughout the invoice period.

Task 2 – Temporary Flow Metering

- Solicited proposals from four (4) flow metering firms, or which only three (3) provided responses.
- Reviewed flow metering proposals and made recommendation of award to CSL on November 27, 2013.
- Submitted draft meter and sub-basin maps.
- Flow metering kick-off meeting was held on December 13, 2013 at the City of Reading.
- Twenty-five flow meters were installed December 9-19th, 2013.
- Meetings, teleconferences and coordination with the City occurred throughout the invoice period.

Memorandum

HAZEN AND SAWYER
Environmental Engineers & Scientists

301 Market Street, Suite 1001
Philadelphia, PA 19107

215-592-0600
hazenandsawyer.com

Date: December 11, 2013

To: City of Reading

From: Hazen and Sawyer

Re: Sewer System Model Development and Dry Weather Calibration

Background and Purpose

This memorandum summarizes the development of the City of Reading sewer system model. As part of model development, dry weather calibration was performed using historical 2005 flow monitoring data, and initial wet weather parameters were also established. The dry weather calibration will be updated, and wet weather calibration performed, after collection of temporary flow metering data is completed in early 2014.

The ultimate purpose of the model is to evaluate and identify any baseline and future capacity deficiencies, and develop and evaluate recommended improvements (e.g., I/I reduction, etc.) to convey dry and wet weather flows without capacity-related sanitary sewer overflows (SSO's).

Model Software Selection

The selection of software begins with an understanding of the specific sewer system being modeled and the needs of the project, follows with a broad list of available modeling software, and finishes with a short list being evaluated in greater detail.

The selected sewer hydraulic model must satisfy the following basic criteria:

Performance

- Capable of solving fully dynamic hydraulic equations (i.e., St. Venant);
- Capable of simulating both gravity and pressurized sewers in a robust manner during the same simulation (also capable of switching between gravity and pressurized flow in a particular pipe during the same simulation); and
- Calculations must be fast, stable and reliable.

Data Management

- Compatible with GIS data;
- Able to export/import from/to other modeling frameworks;
- Able to create versions and track changes to each modeled scenario easily and efficiently;
- Has potential to link model data to CIP data; and
- Has an easy-to-use interface for both experienced and casual users.

Results

- Able to view results quickly and efficiently within a single software framework (critical for calibration and alternatives analysis);
- Able to export results to GIS;
- Able to perform statistical analysis of results;
- Separate results viewer available for users that simply want to view the results, not perform simulations; and
- Able to customize model results report.

Other Capabilities

- Ability to easily model real-time control scenarios (dynamic gates, weirs, pumps etc).

Given the nature and characteristics of the City of Reading's sewer system, its complexity, and the need for very fast, reliable, robust results within a mandated Consent Decree schedule, InfoWorks CS software was chosen for this project. For this project in particular, the software must also be capable of providing reliable results for a system with multiple diversions, bifurcations, gravity and pressure sewers, and other complicating features in a grid-type system. Not all software packages handle complexities like these in a reliable manner. Table 1 provides a weighted ranking for a selected short-list of software packages that were initially evaluated for this project.

The InfoWorks software is a fully dynamic wastewater and storm water modeling and management software application that performs fast, accurate, reliable simulations utilizing the fully-dynamic St. Venant governing equations to represent the hydraulic behavior of sewer systems. InfoWorks uses a system of integrated relational databases to store and apply data describing the collection system, and has the ability to handle non-uniform, non-steady flow behavior, including surcharged pipes, looped networks, bi-directional flow, bifurcations, backwater, and the calculations can transition between gravity and pressurized flow at any point during the simulation while maintaining stable output. InfoWorks also contains an array of options for simulating the hydrologic cycle for converting rainfall into inflow into the modeled sewer system.

Table 1: Summary of Ranked Modeling Software

Software	Weight Factor (100%)	InfoWorks CS		Mike Urban Mouse		InfoSWMM		SewerGEMs	
		Raw	Weighted	Raw	Weighted	Raw	Weighted	Raw	Weighted
Model Calculation	18%	4	0.72	4	0.72	2	0.36	2	0.36
Performance	18%	4	0.72	3	0.54	2	0.36	1	0.18
Data Management	12%	4	0.48	3	0.36	3	0.36	2	0.24
Data Interchange	12%	3	0.36	4	0.48	4	0.48	3	0.36
User Interface	10%	4	0.4	3	0.3	3	0.3	2	0.2
Results Presentation	7%	3	0.21	3	0.21	4	0.28	2	0.14
Results Analysis	11%	4	0.44	3	0.33	3	0.33	2	0.22
Technical Support	7%	4	0.28	3	0.21	2	0.14	2	0.14
Licensing	3%	2	0.06	2	0.06	4	0.12	2	0.06
Other Capacity	2%	4	0.08	4	0.08	3	0.06	2	0.04
Average		**3.6**	**3.8**	**3.2**	**3.3**	**3.0**	**2.8**	**2.0**	**1.9**

Model Development

Overall

A hydrologic/hydraulic model of a sewer or drainage system is a mathematical representation of an actual physical collection system. Data describing the physical characteristics of the system as well as input data and boundary information are supplied to the modeling program that simulates the response of the collection system to varying dry and wet weather flows under particular groundwater conditions. Physical data describing the collection system infrastructure includes pipe diameter, invert elevation, length, roughness, manhole invert and rim elevation, pump location and data, and sediment conditions, etc. Other model input data includes precipitation, dry weather flow characteristics, and boundary information (e.g., assumed water level at terminus of model, if applicable).

The modeling program uses this information about the collection system together with a set of equations which are then solved by the program to simulate specific conditions of I/I, surface runoff, sewer flow, and determine resulting flows and levels within the piping network, under varying boundary conditions. The model will be used to predict the impacts of future growth and develop improvements to mitigate capacity deficiencies. It is imperative that the results provided by the calibrated model simulate observed conditions as closely as possible. An essential step in ensuring accuracy is model calibration, which is the process of adjusting data describing the mathematical model of the system until model-predictions are in reasonable agreement with observed data over a wide range of environmental conditions. Verification of the calibrated

model is then performed by comparing model results to an independent set of actual observations without making adjustment.

Model Input Data Sources

The InfoWorks model includes a network that is subdivided into three primary features: subcatchments, links (includes sewer conduits, pump stations weirs, gates, or any other appurtenances), and nodes (includes manholes, outfalls, wet wells, storage tanks, blind connections, and any other point along a piped network where physical characteristics change). The model network for any modeling project typically consists of a subset of the actual sewer system, and this subset is often determined by a variety of factors including project needs, computer hardware or software limitations, budgetary restraints, regulatory requirements and availability/reliability of data. In this project, the Consent Decree requires that sewers 18 inches in diameter and greater be included explicitly in the model network while the RFP required 15 inches in diameter. In any event, there will be some exceptions for situations where smaller diameter sewers are required (i.e., connectivity reasons, etc.).

Physical data describing the modeled system include horizontal and vertical data for manholes and sewer pipes, and include x-y coordinates, manhole rim and invert elevation, pipe invert elevation, pipe diameter, and pipe length. The spatial location information for manholes and pipes was initially derived from the City's geographic information system (GIS) data. The GIS database contained sewer network data including physical layout, pipe diameters, lengths and inverts, as well as manhole rim elevations, all of which were entered into the model database. A large portion of this GIS data was obtained from field surveys. For example, there are 920 pipe inverts in the model, and 782 of those were based on GIS data (the majority of which are based on survey data). The remainder were interpolated (94) or based on record drawings (44).

Model subcatchments represent the hydrologic units where runoff is generated from rainfall, and is tributary to (and consequently introduced into) the piping network. Subcatchments were delineated based on general topography and existing sewer system GIS data, particularly the flow of wastewater throughout the modeled system. Existing City GIS shape files of sub-sewersheds were used as an initial starting point. These areas were then further revised and sub-divided as required to develop the appropriate resolution of flow input into the modeled sewer network.

Pump station peak capacities and operational set points were obtained from existing data sources (e.g., facility reports and conversations with City staff) or were estimated. Pumps were represented as simple screw pumps with head vs. discharge relationships established to allow the pumps to reach a defined peak capacity in the model. The peak capacity includes any standby or backup pumps and establishes, for modeling purposes, the ultimate potential peak capacity the station could operate at during a wet weather event. For simplicity and to optimize simulation run times, force mains were not explicitly modeled, but rather flow was pumped directly from the wet well to the point of discharge to the gravity system.

After these data sources were exhausted, any remaining data gaps in the model were either populated via interpolation/extrapolation from nearby sewer segments or manholes. The terminal point in the model is the wastewater treatment plant, where flows are received from the Fritz Island Headworks and 6th and Canal pump stations. Other details will be explicitly included in the model in the vicinity of the WWTP, including direct connections from Cumru (for example), once wet weather calibration is initiated.

Figure 1 illustrates the model network, Table 2 summarizes the hydraulic model pipe inventory, and Table 3 summarizes input data for the modeled pump stations.

QA/QC Procedures

Ensuring that accurate information is utilized by the hydraulic model is essential to having confidence that the hydraulic model accurately replicates the response of the actual sewer system to wet and dry weather flow. To help maintain the integrity of a hydraulic model's results, InfoWorks performs a series of QA/QC checks before running a simulation to ensure that the model contains no gross errors.

Network validation checks are built-in to InfoWorks to identify common network or modeling errors. The checks are each graded with a severity level. An error rating indicates that a serious problem exists and will prevent a simulation from being performed. These problems are typically obvious modeling deficiencies (such as missing required data fields) that would cause the simulation to fail. Warnings and Informational messages are less serious issues that could still present a problem and should be investigated, but will not prevent a simulation run. Warnings and Information messages typically involve data inconsistencies in the hydraulic model. These types of problems might include elevation discrepancies for a pipe invert, etc.

InfoWorks requires that a model network be successfully validated (i.e., no errors) before that network is allowed to be used in a simulation. Additionally, manual inspection of pipe profiles is helpful for assessing pipe invert elevation problems and verifying that the overall profiles of pipes, especially interceptors, are logically consistent with what is expected.

The combination of these various checks helped ensure that the network data in the hydraulic model was accurate and reasonable.

Dry Weather Flows

Dry weather flows were developed from an analysis of the 2005 flow monitoring data (collected by CSL Services, Inc.) at each of the meter locations. The data was screened, using a software tool, referred to as HazenQ. This tool quickly identifies dry weather periods amongst a continuous flow and rainfall data set, for the purpose of calculating average dry weather flows and subsequently disaggregating the flows into components. The dry weather flows were separated into two components, base sanitary flow (SF) and base groundwater infiltration (GWI). Base sanitary flow was allowed to fluctuate according to a diurnal pattern, while the base infiltration value was held constant. These values represent the average flows during all dry weather days identified during the monitoring period.

Distribution of dry weather flows from the meter data to the individual model subcatchments was based on the relative proportion of area. There are various methods of distributing dry weather flow throughout a sewer system model (e.g., by sewered area, water consumption, linear footage, etc.) but the area method is a simple and efficient approach.

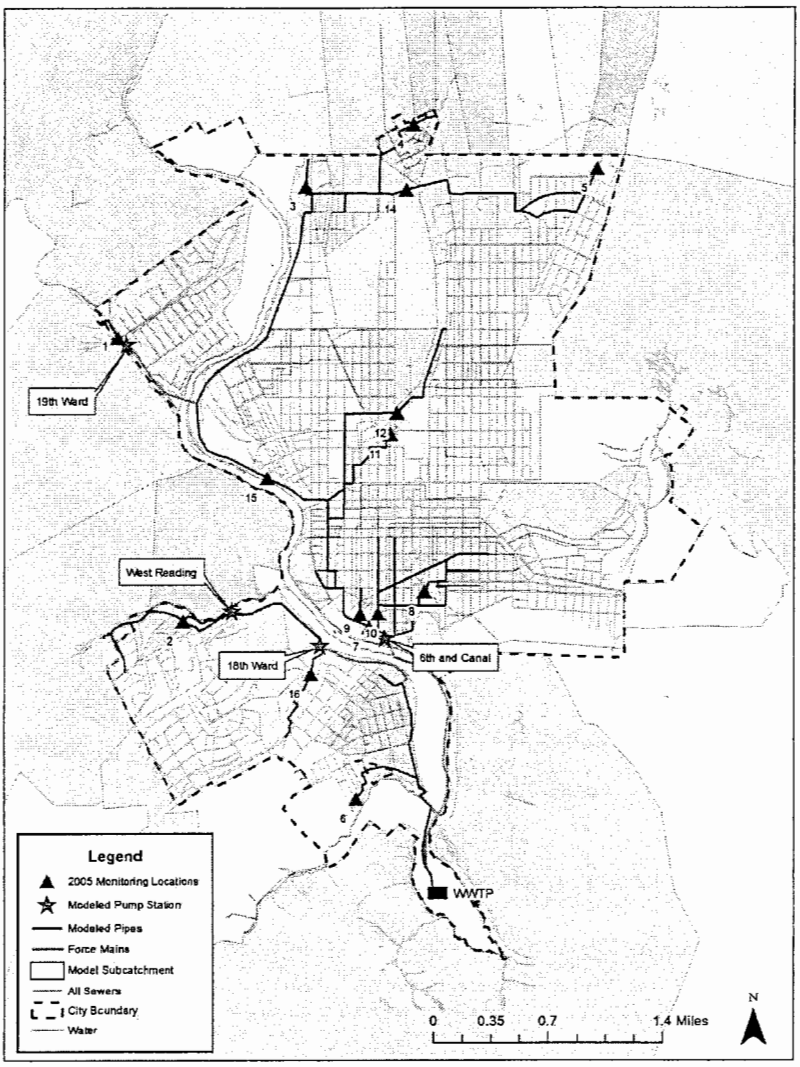


Figure 1: Model Network and Flow Monitoring Locations

Table 2: Hydraulic Model Pipe Inventory

Gravity Sewer Pipe Diameter or Height (Inches)	Pipe Length (ft)	Pipe Length (mi)
6	308.5	0.06
8	357	0.07
10	6,930.8	1.31
12	3,643.6	0.69
15	16,488.3	3.12
16	2,795.8	0.53
18	13,483.5	2.55
20	8,103.3	1.53
21	2,065.5	0.39
24	9,582	1.81
27	898.7	0.17
30	15,018.7	2.84
48	11,488.4	2.18
54	5,208	0.99
63	2,283.7	0.43
72	271.3	0.05
TOTAL	98,927.1	18.74

Table 3: Modeled Pump Station Data

Pump Station	Peak Modeled Capacity (mgd)	On Level (ft-datum)
18th Ward	18.73	198.483
6th and Canal	55.3	174.17
19th Ward	3.3	190.81
West Reading	0.243	195.928

The dry weather days identified by HazenQ were grouped into two categories, weekdays and weekends. The 24-hour diurnal dry weather flow patterns were averaged together for each category to create a set of two diurnal profiles for each meter location. These profiles were then normalized based on the average daily flow to create dimensionless diurnal peaking factor patterns, which were then automatically applied in the model according to the days of the week of the particular simulation. This process allows for the dry weather flow to fluctuate according to its actual diurnal pattern, a more detailed and accurate approach versus using a constant average value.

Table 4 summarizes the dry weather flows applied in the model.

Table 4: Modeled Dry Weather Flows (based on 2005 data)

Meter Subbasin	Base Sanitary Flow (mgd)	Base Groundwater Infiltration (mgd)	Total Dry Weather Flow (mgd)
1	0.182	0.072	0.255
2	1.390	0.563	1.953
3	0.827	0.663	1.490
4	0.420	0.556	0.976
5	0.039	0.033	0.072
6	0.406	0.256	0.662
7*	0.000	0.000	0.000
8	0.512	0.679	1.190
9	0.117	0.113	0.230
10	0.270	0.257	0.528
11	0.137	0.078	0.215
12	0.955	0.369	1.324
14	0.255	0.309	0.564
15	2.173	0.000	2.173
16	0.141	0.045	0.186
Unmetered areas**	0.027	0.007	0.033
Total	**7.85**	**4.00**	**11.85**

Table Notes:
*Meter 7 data indicated net negative flows (after subtracting upstream meter flows), thus zero flow was added in this portion of the system in order to balance the modeled flows downstream.
**Unmetered area flows were estimated based on neighboring sub-basin unit flow rates (i.e., gpd/acre).
***Totals may not sum exactly due to decimal rounding.

Wet Weather Flows

Since the City's sewer system is a separate sanitary system, wet weather flow enters the sewers via rainfall dependent infiltration and inflow (RDI/I). The RTK unit hydrograph method, as defined below, was used as the hydrologic routine for representing the wet weather response in the sewer system model due to RDI/I. Initial wet weather parameters were set up in the model. These values will be calibrated and finalized after collection of additional temporary flow and rainfall monitoring data is completed in early 2014.

The RTK method uses three triangular-shaped unit hydrographs to represent the RDI/I flow. Three parameters define each triangular unit hydrograph: R (ratio of RDI/I volume to rainfall volume), T (time to peak), and K (ratio of "time to recession" to "time to peak"). The first set of parameters (R1, T1, K1) represent the fast response of the sewer system to inflow, the second set (R2, T2, K2) represents the delayed response of the system to infiltration, while the third set (R3, T3, K3) represents the much longer and slower response of the sewer system to infiltration that could last days and weeks. This method is consistent with the approach that is used in other sewer models and is a standard industry-accepted practice. Figure 2 illustrates this methodology as it relates to the wet weather RDI/I sewer system response.

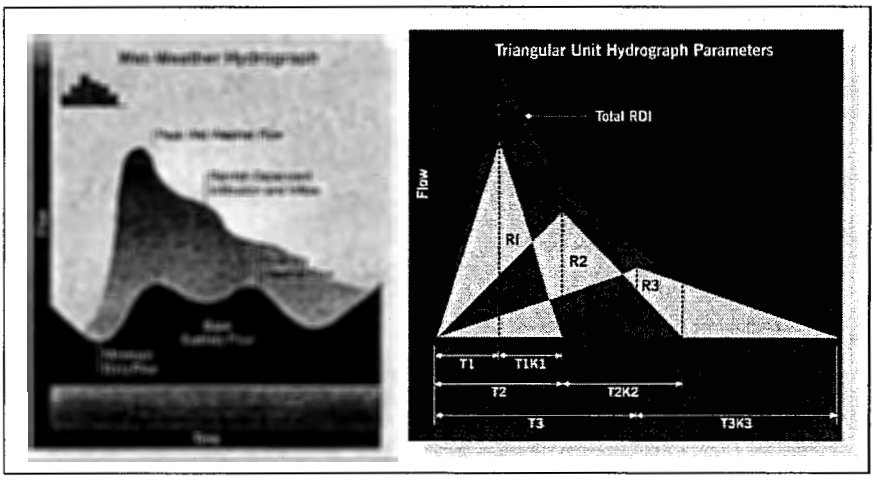


Figure 2: RTK Unit Hydrograph Methodology

Model Calibration

Dry weather flow calibration was accomplished by simulating a dry weather week and comparing the modeled versus observed flows and volumes at each metering location. Typically, very little adjustment is necessary during dry weather calibration, since the dry weather variables (flows, diurnal patterns) are input directly into the model.

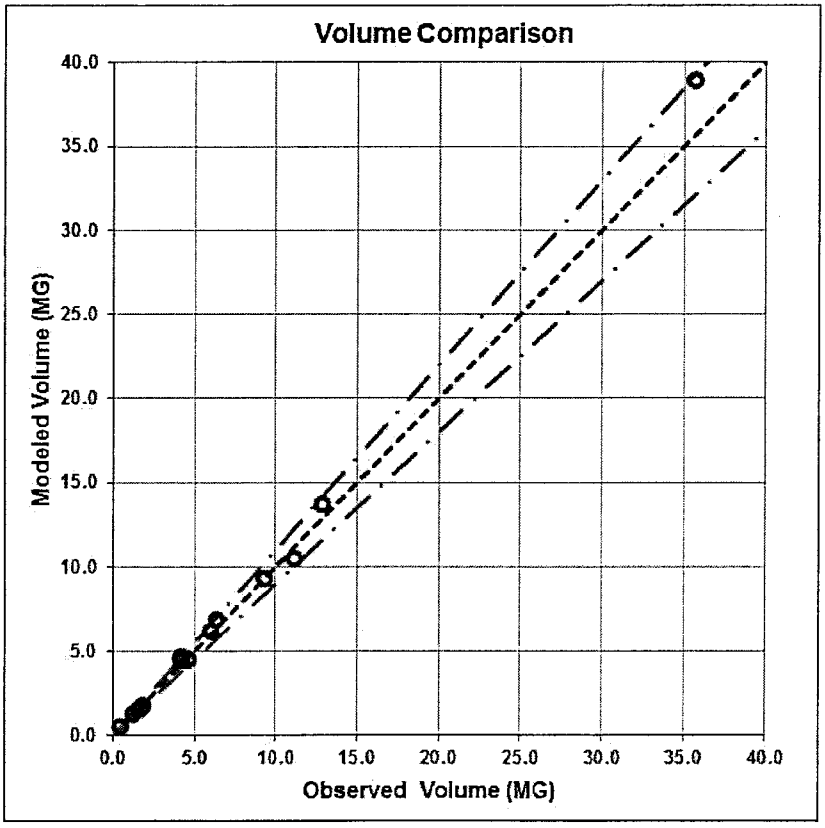


Figure 3: Dry Weather Flow Calibration Results

Based on generally accepted practice, model accuracy and robustness is achieved by setting the model calibration parameters (within an acceptable range) such that the model's predicted response matches that of an observed or measured response (e.g., monitored field conditions). The following paragraphs summarize the model calibration criteria as described in the industry standard guideline document, "Wastewater Planning Users Group (WaPUG) Code of Practice for the Hydraulic Modelling of Wastewater Systems, November 2002."

Generally, the comparison of predicted and observed responses were quantified in a statistical framework and visually through observed versus model-predicted plots for each location in the model (i.e., meter locations) where the respective data is compared.

These calibration criteria serve as a guideline:

Primary Goals of Model Calibration:

- Matching as closely as possible the ratio of the time to peak for the modeled and observed events indicating that the shapes of the modeled and observed hydrographs are similar.

Dry Weather Flow Calibration:

- Modeled peak flows should be within 10 percent of the observed peak flows,
- Modeled 24-hour volumes should be within 10 percent of the observed volumes, and

Wet Weather Flow Calibration:

- Modeled peak flows should be within +25 percent and -15 percent of the observed peak flows,
- Modeled storm event volumes should be within +20 percent and -10 percent of the observed volumes,
- Modeled depths of flow in surcharged sewers should be within +1.6 feet and -0.33 feet

Figure 3 shows the percent differences between model-predicted volumes relative to observed values for a dry weather week (6/20/2005 to 6/27/2005). Calibration criteria ranges (pink dashed lines) are also shown on this plot.

The model is calibrated to dry weather conditions observed during the monitoring period. Figure 3 indicates that total volume is within the guideline ranges for all 15 monitoring locations. It is important to note that since the model is configured to represent the dry weather flow response in the sewer system for a typical, average condition, it may not always appear to match perfectly to any one particular calendar day, due to that particular day's departure from the average.

Wet weather calibration of the model will be completed after additional temporary flow and rainfall data is collected in early 2014.

CITY OF READING, PENNSYLVANIA

PUBLIC WORKS
503 N. 6TH SSTREET
READING, PA 19601
(610) 655-6236

RALPH JOHNSON
ACTING PUBLIC WORKS DIRECTOR

April 25, 2014

Certified Mail
Return Receipt Requested

Ms. Margaret L. Hutchinson, Esq.
Assistant United States Attorney
Civil Division Eastern District of Pennsylvania
615 Chestnut Street
Suite 1250
Philadelphia, PA 19106-4476

Re: City of Reading Consent Decree
Calendar Quarterly Progress Report
1st Quarter 2014

Dear Ms. Hutchinson:

In accordance with Section VI Reporting Requirements, Paragraph 41, you will find enclosed the City of Reading's Calendar Quarterly Report. This report documents progress and status on the implementation of Section V Remedial Measures described in Paragraphs 7 through 40. Please feel free to contact me at 610-655-6236 should you have any comments or questions.

Sincerely,

Ralph E. Johnson

Ralph E. Johnson, PE
Acting Public Works Director

REJ/ts
Enclosure
C: Christopher A. Day, Esq., US EPA
Lisa Trakis, US EPA
Shawn Arbaugh, PA DEP
Gary Hepford, PA DEP
Carole Snyder, Managing Director
Deborah A.S. Hoag, P.E., Utilities Systems Manager
Anthony C. Vesay, P.E., Hill International
Keith Mooney, Esq., Legal Counsel
John J. Miravich, Esq., Fox Rothschild
file

City of Reading Consent Decree
Calendar Quarterly Progress Report
Period Ending March 31, 2014

V. REMEDIAL MEASURES

A. General Duties

7. Duty to Comply with Permit – The City's wastewater treatment plant (WWTP) was in compliance with the NPDES permit parameters.

8. Operation and Maintenance of the Facility – No change. The operation and maintenance ongoing program is implemented.

B. Interim Measures

9. Interim Compliance – Environmental Management System

(b) Maintenance Management System – No change. The WWTP computerized maintenance management system (CMMS) ongoing program is implemented.

(c) Supervisory Control and Data Acquisition (SCADA) System

1. Upgrades to the Interim SCADA System – No change. The WWTP SCADA system ongoing program is implemented and is periodically updated as appropriate.

2. Upgrades to the SCADA System – No change. This measure will be addressed under the Wastewater Treatment Plant upgrade.

(d) Pretreatment Data Management System – Continuing progress. The City continues the use of a commercial pretreatment database as well as an abbreviated spreadsheet for simplicity and verification.

10. Interim Plant Influent Monitoring – No change. The plant influent monitoring ongoing program is implemented.

11. Interim Trickling Filter Performance Measures

(a) Performance Improvements – No change. The trickling filter performance measures ongoing program is implemented.

12. Process Control Testing – No change. The process control testing ongoing program is implemented.

13. Dangerous Gas Detection – No change. The gas detection ongoing program is implemented.

14. Certified Plant Operators – No change. The ongoing 24/7 qualified supervisor coverage is implemented.

15. Operations and Maintenance Plan – No change. The operations and maintenance plan remains in place and is annually reviewed and updated as appropriate.

16. Staffing Plan – No change. The ongoing 24/7 supervisor coverage is implemented. The ongoing communication process is implemented.

17. Interim Wet Weather Operational Strategy – No change. Please see the wet weather operation plan.

C. Long Term Evaluation and Construction Schedule – In addition to the Wastewater Treatment Plant this remedial measure reporting includes activities associated with pump stations, force mains and 537 planning.

The 42" flow-meter replacement project is complete.

The 42" force main project is nearing completion. The existing river crossing is being lined as a backup pipe in compliance with a previous PaDEP requirement.

We are in the process of selecting a design engineer for the Sixth and Canal Pump Station (6&CPS) phase I work.

Weston Solutions continues to work on the 6&CPS ground and groundwater contamination issue.

Hazen and Sawyer 19th Ward Pump Station (19WPS) assessment, alternatives evaluation and capital improvements plan is complete.

The Anaerobic Digester Rehabilitation project at the Wastewater Treatment Plant is continuing on schedule. The design is at approximately 90% completion. Based on the November 18th, 2013, meeting with EPA and PaDEP it is the City of Reading understands that the completion of converting Digester #4 for primary digester use will comply with the digester rehabilitation requirement under the consent decree amendment, and that the conversion of Digester #5 is not part of the consent decree amendment. There is a $1,000,000 H2O grant available toward this rehabilitation project.

The Improvements to the Fritz Island WWTP project are being designed by Rummel, Klepper & Kahl, LLP (RK&K) of York, PA. Ongoing progress meetings were conducted and RK&K delivered the final 30% design documents. The final 30% design work revealed that there is a substantial cost overrun projected. Process changes, especially on the solids end of the project, are being proposed to address projected cost overruns while maintaining process functionality. A meeting with EPA and DEP is being scheduled to present the details of the situation. We will determine if another PaDEP 537 plan updates and consent decree paragraph 18 and 19 updates are required. The City and RKK believe we will be able to make up the time delay and still maintain the project bid schedule. The City is pursuing PennVEST funding and bonds for this project.

18. Treatment Plant Alternatives Submission

(a) Existing Plant Process Evaluation Report – No change.

(b) Evaluation of Treatment Alternatives Report – As stated above there are additional revisions to the WWTP design being considered. If required, an additional update to the Evaluation of Treatment Alternatives will be submitted along with an updated 537 Planning Special Study.

19. **Capital Improvements Plan** – No change at this time.
20. **Request for Proposals** – No report.
21. **Permit Applications and Design** – The digester project DEP Part II permit application was approved February 18, 2014.
22. **Permitting** – No report.
23. **Construction Completion** – No report.
24. **Start-Up and Operation** – No report.

D. Collection System

25. **GIS Mapping System** - In progress. See below.

(a) Purpose of GIS System - Not applicable.

(b) GIS Mapping of the Sanitary Sewer Collection System – Certified and continuing. The City transmitted a certification for the functionality of the GIS on June 28, 2013. The City continues to work on improving the accuracy of the information and ensuring the information is kept current as changes are made to the collection system that impact the GIS. During this quarter, Woolpert performed field checks of the elevations where problems may exist. They plan to be on site in the second quarter to make the requisite edits and updates into the database based upon their findings. The City has been using CCTV and magnetic locating as well as cross-referencing between the design plans, GIS, and aerial imagery to investigate and resolve inconsistencies and questions. Discussions have and will continue to include the continual updating and long-term maintenance of the database.

(c) GIS Mapping of the Storm Water Collection System – Certified and continuing. The City transmitted a certification for the functionality of the GIS on June 28, 2013. The City continues improving the accuracy of the information and ensuring the information is kept current as changes are made to the collection system that impact the GIS. During this quarter, Woolpert performed the same tasks for storm as sanitary.

26. **Sanitary Sewer System Evaluation Program**

(a) I/I Analysis by Subsystem

The City continued investigating and updating the mapping required for the coordination of the collection system investigative, modeling, and rehabilitative work.

Hazen & Sawyer continued evaluating the data from various sources to complete the evaluation of the inflow and infiltration into the City's system by subareas.

1. Baseline Flow and Rainfall – In Progress. Flow metering was conducted in 2005 and temporary flow meters were placed in the system again in December 2013. Data collection began mid-December with the flow meters and rain gauges in the system through almost the end of March.

2. Hydraulic Modeling – In Progress. City Council awarded a contract with Hazen & Sawyer for an enhanced scope of services to include this and other collection system engineering support on

October 14, 2013. The hydraulic model was developed and a dry weather calibration was performed using the 2005 flow data. Further calibration for wet weather was done with the new flow data.

(b) Sewer System Evaluation Survey – In Progress. The sanitary manhole numbering system is refined continually as field inventory show additional or missing manholes and will continue as the inventory and system investigations progress and into the future. Hazen & Sawyer has refined subareas with the newer GIS data used as the base.

The computerized maintenance management system implementation project progressed to go live with full-scale geospatially-oriented tracking of preventive and corrective maintenance as well as repairs. The City and Woolpert worked together on Cityworks software configuration for service requests, work orders, and projects to track personnel, equipment, materials, and contractors. The asset relationship for certain activities is being reviewed where there is not a City asset to associate with the work.

After soliciting and evaluating proposals, the City awarded a contract to Woolpert to inspect and evaluate the sanitary sewer system's intermunicipal connection points and flow meters. Woolpert performed field investigation and observations at the points as determined through the Act 537 planning and intermunicipal agreement mapping processes. Additional field work occurred in mid-January with a draft report received for review and comment.

The connection point locations mapped by SSM Group were distributed for municipal review to be finalized with the municipalities prior to the connection point and flow meter report being finalized. Additional changes were incorporated based upon review and comment and the City awaits additional municipal review.

27. Rehabilitation Plan – No progress. *The SSES is required to be complete in order to develop the Rehabilitation Plan.*

28. Rehabilitation of Priority Areas of Collection System – No progress. *The rehabilitation plan is the precursor of this.*

29. Wet Weather Operation Plan – Completed.

E. Pretreatment Program

30. General Duty – In progress. The City has an approved pretreatment program and continues to regulate industrial users in the collection system.

31. Enforcement Response Plan (ERP) Implementation – In progress. The City continues to follow the ERP in order to encourage compliance from all industrial dischargers.

32. ERP - Penalty Escalation and Compliance Schedule – In progress and continuing. The City continues escalating penalties for all industries that are in significant non-compliance for a given parameter for two consecutive quarters. As penalty escalation had not been detailed in the ERP, the City has documented the process and amounts for consistency and as a reference tool.

33. ERP – Order, Permit Revocation, and Federal Referral – In progress. The City continues escalating the enforcement actions focusing on the financial penalties assessed to permittees who remain in significant non-compliance. The City continues to confer with US EPA while attempting to have industries achieve compliance. One industry has been problematic for an extended time following completion of a recent compliance agreement. US EPA requested additional information from the industry and has been speaking with the City regarding this permittee's recent compliance. The City met with an industry representative in 2012 to discuss recent compliance and plans for long-term attainment. During the fourth quarter of 2012, the industry installed an automated skimming system they believe will address their non-compliance. In 2013, the City received communication from a consultant indicating that another phase of pretreatment and is under construction with space allocated for further pretreatment if necessary in the future. The industry continues to have violations during this construction phase.

34. Local Limit Adoption by Contributing Municipalities – In progress. All the municipalities with permitted industries have adopted the ordinance. Electronic versions of the City's sewer use ordinance had been provided to each municipality, engineer, and/or solicitor to prepare for adoption. This requirement is detailed in the revised intermunicipal agreement being reviewed and executed by the contributing municipalities. This is reiterated in the annual request for information to complete the requisite annual system operations report.

35. Non-Residential Connection Evaluation and Investigation – In progress. The City has been working with the contributing municipalities to obtain this information periodically to summarize, survey, and evaluate nonresidential users in the service area that may need to be permitted. A standardized method for routine reporting will be developed in cooperation with the municipalities under the new intermunicipal agreement.

36. Increased Monitoring for Violators – In progress and continuing. The City continues to increase City sampling and encourage increased self-monitoring for industries with violations. In general, permits may be amended or re-issued requiring multiple resamples for parameters with prior compliance issues. Some permits require increased frequency of monitoring for multiple quarters of compliance prior to returning to a less frequent self-monitoring schedule. Additional monitoring by both the City and the industry is tracked and reported annually. The merits of increased self-monitoring are routinely discussed as industries are encourage to do so to avoid SNC and publication.

37. Pretreatment Computerized Management System - In progress and continuing. The City continues data entry into a commercial pretreatment database as well as an abbreviated spreadsheet upon receipt of analytical results from both City and industrial sampling.

38. Local Limits Re-Evaluation – Completed. Evaluation submitted to US DoJ and US EPA on May 5, 2006. Comments were received from US EPA and the City initially worked with B&V to address the comments and concerns. The City's renewed NPDES permit, effective December, 2013, includes requirements for local limits re-evaluation. The local limits sampling plan has been developed

with some locations being modified slightly to be more representative of the system as a whole and to reflect new service area additions.

39. Quarterly SNC Reports to US EPA – In progress. The City has been monitoring penalty payment status and will continue to investigate errors in the penalty payment and posting as reported to the US EPA. The City continues working interdepartmentally to resolve and ensure accurate tracking and reporting in all systems. There were significantly less errors while compiling the 2013 annual report. We will continue to work to resolve this issue as specific entries and adjustments have been identified. There continue to be industries that are not current with their payment, but they are decreasing in number on the specific pretreatment report and overall when doing the investigative reviews. The city has been making follow-up calls to those who are delinquent to prompt payment

F. Funding

40. Funding – In progress. The 2014 budget was approved as presented to City Council with the budgeted transfer amount from the Sewer Fund to the General Fund remaining at $3,000,000. In order to stabilize finances, this transfer has been taken periodically throughout the year.

VI. REPORTING REQUIREMENTS

41. Report Contents and Certification

(a) Remedial Measures Paragraphs 7 through 40 – See above numbered sections.

(b) Anticipated Problems – See italics in above numbered sections.

(c) Additional Matters – See italics in above unnumbered sections.

(d) Certification Statement –

I certify under penalty of law that this information was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my directions and my inquiry of the person(s) who manage the system, or the person(s) directly responsible for gathering the information, the information submitted, is to the best of my knowledge and belief, true, accurate, and complete.

Ralph E. Johnson
Acting Director of Public Works

04/28/14
Date

City of Reading
January 2014
Wastewater Treatment Plant Upgrades
PM/CM Monthly Progress Report
Hill/Weston/Hazen and Sawyer

Executive Summary:
The Project Management/Construction Management (PM/CM) team continued work on Consent Decree related tasks as well as other supporting Wastewater Treatment Plant (WWTP) tasks. Critical work items for January included: continued design oversight work for the WWTP upgrades and secondary digesters rehabilitation projects, continued construction management services for the force main project, Act 2 related work at 6CPS, and project management/controls.

Anticipated work for February includes: review of draft Amended Consent Decree, continued design oversight work for the WWTP upgrades and secondary digesters rehabilitation projects, continued construction management services for the force main project, and continued project management/controls tasks integrating the effort.

A more detailed task breakdown of the January work effort is included in the respective PM/CM's subcontractor invoices/reports.

Project Management (Hill: also see invoice):

- Project Management: reviewed project requirements and maintained a working copy of the Construction Schedules; update the Summary Draw Schedule & submit to project team on 1/21; updated the detailed Draw Schedule & submit to project team on 1/27.
- WWTP (design): Reviewed sub-consultant (Hazen & Sawyer (H&S)) comments regarding the Act 537 Special Study Modification. Researched/reviewed and corresponded w/ City and designer regarding designer's baseline schedule submission(s); coordinated schedule w/ T&M secondary digester schedule. Participated in a joint designer telecon held on 1/16.
- Force Main ("42"): coordinated w/ designer and sub-consultant (Weston) & assisted with construction-related issues, and project controls (e.g. submittal—comments to contractor's (Pact) lining proposal(s), Pay Application #12). Site visit on 1/10/14.
- Secondary Digester Rehabilitation: reviewed designer 60% submission summary; coordination w/ sub-consultant (H&S) and assessed impacts to the schedule. Reviewed designer memo and schedule (Update #9); prepared comments, coordinated w/ City and submitted PM analysis to project team on 1/17. Initial review of designer schedule (Update #10) & coordination w/ Hill scheduler and sub-consultant (H&S).
- 6CPS (Act 2 Study): coordinated w/ sub-consultant regarding reimbursable costs to City and 1/7/14 meeting w/ City, UGI, sub-consultant (Weston).
- Project Controls/Administration functions: project team coordination/integration including action item review, correspondence, and deliverables status. Prepared

Agenda for & attended City Manager Update meeting on 1/10; prepared follow-on action items. Invoice/monthly report preparation. Contract management, including reconciliation of billings to sub consultants and preparation of the PM/CM Tasks/Budget worksheet.

Project Controls (Hill: also see invoice):

- Performed required Project Controls functions: update of the PM/CM Tasks Costs spreadsheet. Attend City Manager Update meeting on 1/10. Revise Detailed and Summary Draw Schedules. Coordination with project team regarding contract administration. Technical support and analysis of T&M's Secondary Digester schedule (Update #9) and RK&K's Baseline Schedule submission(s), amendment support, and Monthly Report preparation.

Primary Digester Rehab Design Support (H&S: also see invoice)

- Reviewed and provided comments on T&M's 60% design.
- Reviewed and commented on T&M's schedule.
- Reviewed the relation of the digester schedule to the WWTP improvement project schedule.

Force Main 42" Construction Management Services (Weston: also see invoice):

- Review and management of Shop Drawings, RFIs, construction schedule updates, and pay application.
- Client and project team discussions related to the Force Main construction project.
- Project controls, budgeting, planning, and progress reporting.

Force Main 42" Construction Management Services (Weston: also see invoice):

- Prepare backup for the environmental costs associated with the 6&CPS investigations and activities.
- Preparation for and attendance at a meeting with UGI and City representatives to discuss updated cost estimate.

Also:

WWTP Design Oversight—Advance

Per client request, H&S, reviewed & provided comments regarding RK&K's Act 537 Special Study Modification. Note that this work is not reflected in this Report as the task had reached its budgeted amount. A proposal to meet the guidance of the client—oversight of the 30% design—is working.

City of Reading
February 2014
Wastewater Treatment Plant Upgrades
PM/CM Monthly Progress Report
Hill/Weston/Hazen and Sawyer

Executive Summary:
The Project Management/Construction Management (PM/CM) team continued work on Consent Decree related tasks as well as other supporting Wastewater Treatment Plant (WWTP) tasks. Critical work items for February included: review of the final draft of the Amended Consent Decree, continued design oversight work for the WWTP upgrades and secondary digesters rehabilitation projects, continued construction management services for the force main project, and continued project management/controls tasks integrating the PM team's effort.

Anticipated work for March includes: continued design oversight work for the WWTP upgrades and secondary digesters rehabilitation projects, continued construction management services for the force main project, and continued project management/controls tasks integrating the effort.

A more detailed task breakdown of the February work effort is included in the respective PM/CM's subcontractor invoices/reports.

Project Management (Hill: also see invoice):

- Project Management: reviewed project requirements and maintained a working copy of the Construction and Draw Schedules.
- WWTP (design): Researched/reviewed and corresponded w/ the City and designer regarding the designer's baseline schedule submission(s), including participation in a telecon w/ the City and RK&K on 2/12; coordinated the schedule w/ T&M's secondary digester schedule. Initial review of RK&K's Basis of Design Report; review of RK&K's corresponding 30% Cost Estimate, coordination w/ sub-consultant (H&S), and preparation of draft comments in preparation for a meeting held on 2/28.
- Force Main (42"): coordinated w/ the designer (EnTech) and sub-consultant (Weston) & assisted with construction-related issues, and project controls (e.g. contractor's/ (Pact) retaining wall submittal, Change Order #3 (lining)).
- Secondary Digester Rehabilitation: coordination w/ sub-consultant (H&S) regarding T&M's responses to H&S's 60% design submission comments; assessed impacts to the schedule. Reviewed designer memo and schedule (Update #10); prepared comments, coordinated w/ the City and submitted PM Analysis to the project team on 2/19. Initial review of designer schedule (Update #11) & coordination w/ Hill scheduler and sub-consultant (H&S).
- Financial: reviewed the Affordability Report prepared by Raftelis (dated 1/13/14) and provided comments to the City.
- Legal: reviewed the Amended Consent Decree from DoJ; prepared recommended edits and submitted them to the project team on 2/4/14.

- Project Controls/Administration functions: project team coordination/integration including action item review, correspondence, and deliverables status. Prepared Agenda for & attended the City Manager Update meeting on 2/28; prepared follow-on action items. Invoice/monthly report preparation. Contract management, including review of sub-consultant's 30% design oversight scope, reconciliation of billings to sub consultants, and preparation of the PM/CM Tasks/Budget worksheet.

Project Controls (Hill: also see invoice):

- Performed required Project Controls functions: Review of RK&K 30% BODR and Cost Estimate and assistance with preparation of PM's comments. Coordination with project team regarding contract administration, including: Task Order support (design oversight), updating of the PM/CM Tasks Costs spreadsheet, and Monthly Report preparation. Technical support and analysis of T&M's Secondary Digester schedule (Update #10) and RK&K's Baseline Schedule submission(s).

Cost Estimating (Hill: also see invoice):

- Performed a high level review of RK&K's 30% Estimate of Probable Construction Cost; review focused on RK&K's applied markups and major cost items.

Primary Digester Rehab Design Support (H&S: also see invoice)

- Reviewed T&M's responses to comments made on the 60% design.
- Performed a technical review of the City's code review and classification issues.
- Reviewed and commented on T&M's schedule.
- Reviewed the relation of the digester schedule to the WWTP improvement project schedule.

Act 537 Special Study (H&S: also see invoice)

- Prepared for and attended meetings relating to the review of the revised Act 537 all activated sludge (AS-1) report.
- Review of RK&K's submittals relating to the all activated sludge (AS-1) option.
- Coordination with RK&K, City, and PM/CM team.

Force Main 42" Construction Management Services (Weston: also see invoice):

- Review and management of Shop Drawings, RFIs, construction schedule updates, and pay application.
- Client and project team discussions and meetings related to the Force Main construction project.
- Project controls, budgeting, planning, and progress reporting.
- Subcontractor services for the preparation of the final report of the removed sections of force main at the 6CPS location.

City of Reading
March 2014
Wastewater Treatment Plant Upgrades
PM/CM Monthly Progress Report
Hill/Weston/Hazen and Sawyer

Executive Summary:
The Project Management/Construction Management (PM/CM) team continued work on Consent Decree related tasks as well as other supporting Wastewater Treatment Plant (WWTP) tasks. Critical work items for March included: continued design oversight work for the WWTP upgrades and secondary digesters rehabilitation projects, continued construction management services for both the force main project and Act 2 Support Services at the 6th & Canal Pump Station (6CPS), and ongoing project management/controls tasks integrating the effort.

Anticipated work for April includes: continued design oversight work for the WWTP upgrades and secondary digesters rehabilitation projects, continued construction management services for the force main project as well as Act 2 Support Services at the 6CPS, and ongoing project management/controls tasks integrating the effort.

A more detailed task breakdown of the March work effort is included in the respective PM/CM's subcontractor invoices/reports.

Project Management (Hill: also see invoice):

- Project Management: reviewed project requirements and maintained a working copy of the Construction and Draw Schedules; refined three programming options and updated Draw Schedule options per client request.
- WWTP (design): Researched and prepared comments regarding designer's (RK&K's) 30% Cost Estimate; reviewed sub-consultant's (Hazen & Sawyer's) cost comparison regarding the all activated sludge option. Coordinated with internal team and provided comments regarding designer's baseline schedule submission(s).
- Force Main (42"): coordinated w/ sub-consultant (Weston) & assisted with construction-related issues, and project controls (e.g. contractor's/ (Pact) retaining wall submittal, redundant pipe lining issues).
- Secondary Digester Rehabilitation: Reviewed designer memo, City Codes correspondence, and schedule (Update #11). Prepared comments coordinated w/ the City and submitted PM Analysis to the project team on 3/31. Initial review of designer memo (Update #12) & coordination w/ Hill scheduler and sub-consultant (H&S).
- 6CPS/Act2 Study: review of sub-consultant's (Weston) submittal for reimbursable costs to the City.
- Financial: researched and corresponded w/ grant writer (DMGS) regarding Act 537 Plan grant program.
- Project Controls/Administration functions: project team coordination/integration including action item review, correspondence, and deliverables status. Prepared

Agenda for & attended the City Manager Update meeting on 3/28; prepared follow-on action items. Contract management, including review of sub-consultant's design oversight scope, invoice/monthly report preparation, reconciliation of billings to sub consultants, and preparation of the PM/CM Tasks/Budget worksheet.

Project Controls (Hill: also see invoice):

- Performed required Project Controls functions: Discussions with the City & assistance with the Draw Schedule (thru 9/30/13 billings); assist with the preparation of various programming scenarios. Technical support regarding bid packages and analysis of RK&K's baseline schedule submission(s) and T&M's Secondary Digester schedule (Update #11). Coordination with project team regarding contract administration, including: Task Order support (design oversight), updating of the PM/CM Tasks Costs spreadsheet, and Monthly Report preparation.

Cost Estimating (Hill: also see invoice):

- Follow on research and coordination regarding RK&K 30% Conceptual Cost Estimate.

Primary Digester Rehab Design Support (H&S: also see invoice)

- Reviewed and provided comments on T&M's 90% design deliverable.
- Performed a technical review of the City's code review and classification issues.
- Reviewed and commented on T&M's schedule.
- Reviewed the relation of the digester schedule to the WWTP improvement project schedule.

Force Main 42" Construction Management Services (Weston: also see invoice):

- Review and management of Shop Drawings, RFIs, construction schedule updates, and pay application.
- Client and project team discussions and meetings related to the Force Main construction project.
- Project controls, budgeting, planning, and progress reporting.
- On-site inspection services and associated project management.

Act 2 Consulting & Support Services for 6CPS (Weston: also see invoice):

- Reviewed UGI's response to the City's cost details for the 6CPS environmental investigations and activities
- Preparations for an attendance at meeting with City and UGI to discuss UGI's responses to the complete cost detail documentation for the 6CPS environmental services.

Hazen & Sawyer
City of Reading Collection Systems Engineering Support

This Progress Report covers the period from January 1, 2014 through March 31, 2014 for engineering services related to the City of Reading Collection System Support.

Primary efforts during this time period included the following activities:

Task 1 - Hydraulic Modeling and Capacity Evaluation

- Initiated capacity evaluation of the connection points from contributing municipalities
- Pump Station information was received from the City at various time during the reporting period
- Meetings, teleconferences, and coordination with the City occurred during the period.

Task 2 – Temporary Flow Metering

- Site Investigation & Installation Reports for all 25 metering locations were made available on January 6, 2014.
- Flow and rain data was received and evaluated periodically.
- Flow meters and rain gauges were removed on March 25, 2014.
- Meetings, teleconferences and coordination with the City occurred throughout the period.

Task 4 – I/I Evaluation

- Wastewater flows within each of the subbasins were divided into groundwater infiltration, sanitary flows, and rainfall dependent infiltration and inflow resulting from the measured rainfall events.
- Evaluation of the monitoring data was completed on March 31, 2014.

Task 6 – Condition Assessment and System Investigation

- Request for proposals for On-call services for CCTV and Manhole inspections was developed during this reporting period. Bids are to be received in April 2014.

CITY OF READING, PENNSYLVANIA

PUBLIC WORKS
503 N. 6TH SSTREET
READING, PA 19601
(610) 655-6236

RALPH JOHNSON
ACTING PUBLIC WORKS DIRECTOR

July 23, 2014

Certified Mail
Return Receipt Requested

Ms. Margaret L. Hutchinson, Esq.
Assistant United States Attorney
Civil Division Eastern District of Pennsylvania
615 Chestnut Street
Suite 1250
Philadelphia, PA 19106-4476

Re: City of Reading Consent Decree
Calendar Quarterly Progress Report
2nd Quarter 2014

Dear Ms. Hutchinson:

In accordance with Section VI Reporting Requirements, Paragraph 41, you will find enclosed the City of Reading's Calendar Quarterly Report. This report documents progress and status on the implementation of Section V Remedial Measures described in Paragraphs 7 through 40. Please feel free to contact me at 610-655-6236 should you have any comments or questions.

Sincerely,

Ralph E. Johnson

Ralph E. Johnson, PE
Acting Public Works Director

REJ/ts
Enclosure
C: Christopher A. Day, Esq., US EPA
Lisa Trakis, US EPA
Shawn Arbaugh, PA DEP
Gary Hepford, PA DEP
Carole Snyder, Managing Director
Deborah A.S. Hoag, P.E., Utilities Systems Manager
Anthony C. Vesay, P.E., Hill International
Keith Mooney, Esq., Legal Counsel
John J. Miravich, Esq., Fox Rothschild
file

City of Reading Consent Decree
Calendar Quarterly Progress Report
Period Ending June 30, 2014

V. REMEDIAL MEASURES

A. General Duties

7. Duty to Comply with Permit – The City's wastewater treatment plant (WWTP) was in compliance with the NPDES permit parameters.

8. Operation and Maintenance of the Facility – No change. The operation and maintenance ongoing program is implemented.

B. Interim Measures

9. Interim Compliance – Environmental Management System

(b) Maintenance Management System – No change. The WWTP computerized maintenance management system (CMMS) ongoing program is implemented.

(c) Supervisory Control and Data Acquisition (SCADA) System

1. Upgrades to the Interim SCADA System – No change. The WWTP SCADA system ongoing program is implemented and is periodically updated as appropriate.

2. Upgrades to the SCADA System – No change. This measure will be addressed under the Wastewater Treatment Plant upgrade.

(d) Pretreatment Data Management System – Continuing progress. The City continues the use of a commercial pretreatment database as well as an abbreviated spreadsheet for simplicity and verification.

10. Interim Plant Influent Monitoring – No change. The plant influent monitoring ongoing program is implemented.

11. Interim Trickling Filter Performance Measures

(a) Performance Improvements – No change. The trickling filter performance measures ongoing program is implemented.

12. Process Control Testing – No change. The process control testing ongoing program is implemented.

13. Dangerous Gas Detection – No change. The gas detection ongoing program is implemented.

14. Certified Plant Operators – No change. The ongoing 24/7 qualified supervisor coverage is implemented.

15. Operations and Maintenance Plan – No change. The operations and maintenance plan remains in place and is annually reviewed and updated as appropriate.

16. Staffing Plan – No change. The ongoing 24/7 supervisor coverage is implemented. The ongoing communication process is implemented.

17. Interim Wet Weather Operational Strategy – No change. Please see the wet weather operation plan.

C. Long Term Evaluation and Construction Schedule – In addition to the Wastewater Treatment Plant this remedial measure reporting includes activities associated with pump stations, force mains and Act 537 planning.

The 42" flow-meter replacement project is complete.

The 42" force main project is substantially complete. The existing river crossing has been lined as a backup pipe in compliance with a previous PaDEP requirement. There are a few items remaining on the contractor's punchlist including removal of silt fencing, replacement of guardrail, repair of automatic gate, and signed and sealed information from the valve manufacturer for the operating shaft/shear pin design.

The Sixth and Canal Pump Station Phase I design services contract was awarded to T&M Associates. The notice-to-proceed was issued on June 4, 2014.

Weston Solutions continues to work on the 6&CPS ground and groundwater contamination issue.

Hazen and Sawyer 19th Ward Pump Station (19WPS) assessment, alternatives evaluation and capital improvements plan is complete.

The Anaerobic Digester Rehabilitation project at the Wastewater Treatment Plant is continuing on schedule. The design has been completed and the bids for the construction of the improvements are schedule to be received on July 9, 2014. The construction is composed of three contracts – General, Electrical and HVAC. Based on the November 18th, 2013, meeting with EPA and PaDEP it is the City of Reading's understanding that the completion of conversion of Digester #4 for primary digester use will comply with the digester rehabilitation requirement under the consent decree amendment and that the conversion of Digester #5 is not part of the consent decree amendment. There is a $1,000,000 H2O grant available toward this rehabilitation project.

The Improvements to the Fritz Island WWTP project are being designed by Rummel, Klepper & Kahl, LLP (RK&K) of York, PA. The final 30% design work revealed that there is a substantial cost overrun projected. Process changes, especially on the solids end of the project, were investigated and are being implemented. In order to maintain schedule, the project has been split into two components – liquid treatment facities upgrade and solids treatment facilities upgrade. The liquid facilities design has been progressed and 60% design documents were delivered May 9, 2014. The solids facilities design was altered significantly and the 30% design documents for the new solids facilities design were delivered on June 16, 2014. The PADEP WQM Part II permit application was submitted on June 30, 2014. The DRBC permit application was submitted and is listed on the DRBC's June 2014 Notice of Applications Received (NAR).

A meeting with PADEP was held on April 28, 2014 at which time the changes to the project were presented. We will determine if another PADEP 537 plan update and consent decree paragraph 18 and 19 updates are required. The City and RKK believe we will be able to make up the time delay and still maintain the project bid schedule. The City is pursuing PennVEST funding and bonds for this project.

The City has issued a Request for Proposals Phase I: Statement of Qualifications for Construction Management for Consent Decree Projects and, separately, for Program Management for Consent Decree Projects. The City desires to separate the two functions that are currently contained under one contract and to enhance the PM services by incorporating higher level program management coupled with coaching and guiding of City staff so that they can perform the lower level tasks.

18. **Treatment Plant Alternatives Submission**
    (a) Existing Plant Process Evaluation Report – No change.
    (b) Evaluation of Treatment Alternatives Report – As stated above there are additional revisions to the WWTP design being considered. If required, an additional update to the Evaluation of Treatment Alternatives will be submitted along with an updated 537 Planning Special Study.
19. **Capital Improvements Plan** – No change at this time.
20. **Request for Proposals** – No report.
21. **Permit Applications and Design** –The WWTP Upgrade project's PADEP WQM Part II Permit application was submitted to PADEP on June 30, 2014. The WWTP Upgrade project's DRBC permit application was submitted and is listed on the DRBC's June 2014 Notice of Applications Received (NAR). The Secondary Digester Rehabilitation project's DRBC permit application was approved on June 11, 2014.
22. **Permitting** – No report.
23. **Construction Completion** – No report.
24. **Start-Up and Operation** – No report.

D. Collection System

25. **GIS Mapping System -** In progress. See below.
    (a) Purpose of GIS System - Not applicable.
    (b) GIS Mapping of the Sanitary Sewer Collection System – Certified and continuing. The City transmitted a certification for the functionality of the GIS on June 28, 2013. The City continues to work on improving the accuracy of the information and ensuring the information is kept current as changes are made to the collection system that impact the GIS. During this quarter, Woolpert performed field checks of the elevations where problems may exist. They were on site in the second quarter to edit and update the database based upon their findings. The City has been using CCTV and magnetic locating as well as cross-referencing between the design plans, GIS, and aerial imagery to investigate and resolve

inconsistencies and questions. Discussions have and will continue to include the continual updating and long-term maintenance of the database.

(c) GIS Mapping of the Storm Water Collection System – Certified and continuing. The City transmitted a certification for the functionality of the GIS on June 28, 2013. The City continues improving the accuracy of the information and ensuring the information is kept current as changes are made to the collection system that impacts the GIS. During this quarter, Woolpert performed the same tasks for storm as sanitary.

26. Sanitary Sewer System Evaluation Program

(a) I/I Analysis by Subsystem

The City continued investigating and updating the mapping required for the coordination of the collection system investigative, modeling, and rehabilitative work.

Hazen & Sawyer continued evaluating the data from various sources to complete the evaluation of the inflow and infiltration into the City's system by subareas.

1. Baseline Flow and Rainfall – In Progress. Flow metering was conducted in 2005 and temporary flow meters were placed in the system again in December 2013. Data collection began mid-December with the flow meters and rain gauges in the system through almost the end of March. All flow and precipitation data were received by Hazen & Sawyer during the second quarter for evaluation and inclusion.

2. Hydraulic Modeling – In Progress. City Council awarded a contract with Hazen & Sawyer for an enhanced scope of services to include this and other collection system engineering support on October 14, 2013. The hydraulic model was developed and a dry weather calibration was performed using the 2005 flow data. Further calibration for wet weather was completed with the new flow, weather, and pump station data.

(b) Sewer System Evaluation Survey – In Progress. The sanitary manhole numbering system is refined continually as field inventory show additional or missing manholes and will continue as the inventory and system investigations progress and into the future. Hazen & Sawyer has refined subareas with the newer GIS data used as the base.

The computerized maintenance management system implementation project progressed to go live with full-scale geospatially-oriented tracking of preventive and corrective maintenance as well as repairs. The City and Woolpert worked together on Cityworks software configuration for service requests, work orders, and projects to track personnel, equipment, materials, and contractors. The asset relationship for certain activities is being reviewed where there is not a City asset to associate with the work. Options for tracking this work in the CMMS are being evaluated.

After soliciting and evaluating proposals, the City awarded a contract to Woolpert to inspect and evaluate the sanitary sewer intermunicipal connection points and flow meters. Woolpert performed field

investigation and observations at the points as determined through the Act 537 planning and intermunicipal agreement mapping processes. In the draft report received in the first quarter, the City noted physical discrepancies in connection point locations as documented. Additional field time spent documenting and updating with accurate locations for review of an updated draft.

The connection point locations mapped by SSM Group were distributed for municipal review to be finalized with the municipalities prior to the connection point and flow meter report being finalized. Additional changes were incorporated based upon review and comment and the City awaits additional municipal review. Based upon the mapping issue above, additional information was forwarded for incorporation and revision.

On April 11, 2014, the City received four proposals for Closed Circuit Television (CCTV) and Manhole (MH) Inspection On-Call Service Contracts. After technical review, all proposers were determined to be qualified, and City Council awarded to all proposers at their April 14th meeting. CCTV inspection work in specific subareas is currently assigned to RedZone Robotics. By June 30th, 1285 pipe segments were attempted of 1400 pipe segments assigned for a total of 220,691 lineal feet of sanitary sewer inspected. An additional 1348 pipe segments were assigned to RedZone Robotics on June 20th to be completed upon finalizing their first assignment. This data will be reviewed and evaluated for the SSES and Rehabilitation Plan.

27. Rehabilitation Plan – No progress. *The SSES is required to be complete in order to develop the Rehabilitation Plan.*

28. Rehabilitation of Priority Areas of Collection System – No progress. *The rehabilitation plan is the precursor of this.*

29. Wet Weather Operation Plan – Completed.

E. Pretreatment Program

30. General Duty – In progress. The City has an approved pretreatment program and continues to regulate industrial users in the collection system.

31. Enforcement Response Plan (ERP) Implementation – In progress. The City continues to follow the ERP in order to encourage compliance from all industrial dischargers.

32. ERP - Penalty Escalation and Compliance Schedule – In progress and continuing. The City continues escalating penalties for all industries that are in significant non-compliance for a given parameter for two consecutive quarters. As penalty escalation had not been detailed in the ERP, the City has documented the process and amounts for consistency and as a reference tool.

33. ERP – Order, Permit Revocation, and Federal Referral – In progress. The City continues escalating the enforcement actions focusing on the financial penalties assessed to permittees who remain in significant non-compliance. The City continues to confer with US EPA while attempting to have industries achieve compliance. One industry has been problematic for an extended time following

completion of a recent compliance agreement. US EPA requested additional information from the industry and has been speaking with the City regarding this permittee's recent compliance. The City met with an industry representative in 2012 to discuss recent compliance and plans for long-term attainment. The industry installed an automated skimming system they believe will address their non-compliance for oil and grease. In 2013, another phase of pretreatment was constructed with space allocated for further pretreatment if necessary. Since the system has been on-line, their compliance has improved to sporadic violations with decreasing frequency and inconsistent noncompliance instead of SNC.

34. Local Limit Adoption by Contributing Municipalities – In progress. All the municipalities with permitted industries have adopted the ordinance. Electronic versions of the City's sewer use ordinance had been provided to each municipality, engineer, and/or solicitor to prepare for adoption. This requirement is detailed in the revised intermunicipal agreement being reviewed and executed by the contributing municipalities. This is reiterated in the annual request for information to complete the requisite annual system operations report.

35. Non-Residential Connection Evaluation and Investigation – In progress. The City has been working with the contributing municipalities to obtain this information periodically to summarize, survey, and evaluate nonresidential users in the service area that may need to be permitted. A standardized method for routine reporting will be developed in cooperation with the municipalities under the new intermunicipal agreement.

36. Increased Monitoring for Violators – In progress and continuing. The City continues to increase City sampling and encourage increased self-monitoring for industries with violations. In general, permits may be amended or re-issued requiring multiple resamples for parameters with prior compliance issues. Some permits require increased frequency of monitoring for multiple quarters of compliance prior to returning to a less frequent self-monitoring schedule. Additional monitoring by both the City and the industry is tracked and reported annually. The merits of increased self-monitoring are routinely discussed as industries are encouraged to do so to avoid SNC and publication.

37. Pretreatment Computerized Management System - In progress and continuing. The City continues data entry into a commercial pretreatment database as well as an abbreviated spreadsheet upon receipt of analytical results from both City and industrial sampling.

38. Local Limits Re-Evaluation – Completed. Evaluation submitted to US DoJ and US EPA on May 5, 2006. Comments were received from US EPA and the City initially worked with B&V to address the comments and concerns. The City's renewed NPDES permit, effective December, 2013, includes requirements for local limits re-evaluation. The local limits sampling plan was developed with some locations being modified slightly to be more representative of the system as a whole and to reflect new service area additions. The City began formal documentation of the sampling locations for a local limits site sampling plan focusing on the collection system locations. Two locations are still being reviewed while the sampling and analysis has commenced.

39. Quarterly SNC Reports to US EPA – In progress. With all the reports submitted for the first quarter, we are pleased that no SIUs were in SNC. The City has been monitoring penalty payment status and will continue to investigate errors in the penalty payment and posting as reported to the US EPA. The City continues working interdepartmentally to resolve and ensure accurate tracking and reporting in all systems. There were significantly less errors while compiling the 2013 annual report. We will continue to work to resolve this issue as specific entries and adjustments have been identified. There continue to be industries that are not current with their payment, but they are decreasing in number on the specific pretreatment report and overall when doing the investigative reviews. The City has been making follow-up calls to those who are delinquent to prompt payment.

F. Funding

40. Funding – In progress. The 2014 budget was approved as presented to City Council with the budgeted transfer amount from the Sewer Fund to the General Fund remaining at $3,000,000. In order to stabilize finances, this transfer has been taken periodically throughout the year.

VI. REPORTING REQUIREMENTS

41. Report Contents and Certification

(a) Remedial Measures Paragraphs 7 through 40 – See above numbered sections.

(b) Anticipated Problems – See italics in above numbered sections.

(c) Additional Matters – See italics in above unnumbered sections.

(d) Certification Statement –

I certify under penalty of law that this information was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my directions and my inquiry of the person(s) who manage the system, or the person(s) directly responsible for gathering the information, the information submitted, is to the best of my knowledge and belief, true, accurate, and complete.

Ralph E. Johnson
Acting Director of Public Works

07/23/14
Date

City of Reading
April 2014
Wastewater Treatment Plant Upgrades
PM/CM Monthly Progress Report
Hill/Weston/Hazen and Sawyer

Executive Summary:
The Project Management/Construction Management (PM/CM) team continued work on Consent Decree related tasks as well as other supporting Wastewater Treatment Plant (WWTP) tasks. Critical work items for April included: continued design oversight work for the WWTP upgrades and secondary digesters rehabilitation projects; continued construction management services for both the force main project and Act 2 Support Services at the 6th & Canal Pump Station (6CPS), and ongoing project management/controls tasks integrating the effort.

Anticipated work for May includes: continued design oversight work for the WWTP upgrades and secondary digesters rehabilitation projects (100% design review), Act 2 Support Services at the 6CPS, scheduled completion of construction management services for the force main project, and ongoing project management/controls tasks integrating the effort.

A more detailed task breakdown of the April work effort is included in the respective PM/CM's subcontractor invoices/reports.

Project Management (Hill: also see invoice):

- Project Management: reviewed project requirements and updated the Amended Consent Decree project schedule. Refined three programming options and updated the corresponding Draw Schedules per client request. Submitted the project schedule & summary draw schedules to the client at our 4/11 meeting; began to incorporate client comments & correspond with the client regarding programming/scheduling issues.
- WWTP (design): Review designer slides/correspondence regarding cost reduction options.
- Force Main (42"): coordinated w/ sub-consultant (Weston) & assisted with construction-related issues, and project controls (e.g. 3-week look ahead schedule, redundant pipe lining issues). Site visit and discussions w/ sub-consultant/Weston on 4/11.
- Secondary Digester Rehabilitation: Reviewed designer responses to sub-consultant's/Hazen & Sawyer's 90% design oversight comments. Reviewed and commented on the designer's 90% front end bid specifications; discussed during a client/designer/PM call on 4/25. Reviewed designer schedule (Update #12), prepared comments, coordinated w/ the City and submitted PM Analysis to the project team on 4/29.
- 6CPS/Act2 Study: review rebuttal from UGI/Stantec regarding sub-consultant's/Weston's submittal for reimbursable costs to the City; review Weston's response to UGI's counteroffer and discussed w/ sub-consultant.

- Financial: researched and corresponded w/ client regarding Act 537 Plan grant program.
- Project Controls/Administration functions: project team coordination/integration including action item review, correspondence, and deliverables status. Prepared Agenda for & attended the City Manager Update meeting on 4/11; prepared follow-on action items. Contract management, including preparation of a task order for designer oversight & submission on 4/16, Reconciliation Amendment VI (submission on 4/30), invoice/monthly report preparation, reconciliation of billings to sub consultants, and preparation of the PM/CM Tasks/Budget worksheet.

Project Controls (Hill: also see invoice):

- Performed required Project Controls functions: reviewed and provided technical analysis of T&M's 90% design specifications & provided technical support and analysis of T&M's Secondary Digester schedule (Update #12). Discussions with the City & assistance with the Draw Schedules (thru 12/31/13 billings). Assisted with the updating of the overall Amended Consent Decree project Schedule and discussed with the City. Coordination with project team regarding contract administration, including: Task Order support (design oversight, reconciliation amendment VI), updating of the PM/CM Tasks Costs spreadsheet, and Monthly Report preparation.

Primary Digester Rehab Design Support (H&S: also see invoice)

- Participated in a conference call regarding the 90% design.
- Reviewed T&M's responses to H&S 90% design comments.
- Reviewed and commented on T&M's schedule and its relations to the WWTP improvements project schedule.

Force Main 42" Construction Management Services (Weston: also see invoice):

- On-site inspection services and associated project management.
- Review and management of Shop Drawings, RFIs, construction schedule updates, and pay application.
- Client and project team discussions and meetings related to the Force Main construction project.
- Project controls, budgeting, planning, and progress reporting.

Act 2 Consulting & Support Services for 6CPS (Weston: also see invoice):

- Prepared a draft letter containing an assessment and recommendation in response to UGI's analysis of Weston's cost detail for the 6CPS environmental investigations and activities.

City of Reading
May 2014
Wastewater Treatment Plant Upgrades
PM/CM Monthly Progress Report
Hill/Weston/Hazen and Sawyer

Executive Summary:
The Project Management/Construction Management (PM/CM) team continued work on Consent Decree related tasks as well as other supporting Wastewater Treatment Plant (WWTP) tasks. Critical work items for May included: continued design oversight work for the WWTP upgrades and secondary digesters rehabilitation projects (100% design review), construction management services for the force main project, and ongoing project management/controls tasks integrating the effort.

Anticipated work for June includes: continued design oversight work (review of 30% Solids) for the WWTP upgrades and secondary digesters rehabilitation projects (bid phase), construction management services for the force main project (project closeout), and ongoing project management/controls tasks integrating the effort.

A more detailed task breakdown of the May work effort is included in the respective PM/CM's subcontractor invoices/reports.

Project Management (Hill: also see invoice):

- Project Management: maintained working copies of the Construction and Draw Schedules; submitted Summary Draw Schedules to client on 5/7. Discuss schedules with client during a meeting on 5/15.
- WWTP (design): Review/comment on designer slides regarding 4/28 briefing to PaDEP. Research Second Opinion requirements and correspond with City regarding execution. Reviewed designers 60% Liquids submittal, prepared draft comments, and attended a design review meeting on 5/15.
- Force Main (42"): coordinated w/ sub-consultant (Weston) & assisted with construction-related issues, and project controls (e.g. redundant pipe lining issues, release valve issues, substantial completion).
- Secondary Digester Rehabilitation: Reviewed designer's 90% Front End Documents (Division 00, 01) and submit comments to project team; reviewed scheduling specification and provide comments to project team. Reviewed designer's 100% submittal (Front End Documents) and provided comments on 5/21. Reviewed designer schedule (Update #13), prepared comments, coordinated w/ the City and submitted PM Analysis to the project team on 5/29.
- PM Administration functions: project team coordination/integration including action item review, correspondence, and deliverables status. Updated project action items for the client for a meeting on 5/16 (did not attend). Contract management, including invoice/monthly report preparation, reconciliation of billings to sub consultants, and preparation of the PM/CM Tasks/Budget worksheet.

Project Controls (Hill: also see invoice):

- Performed required Project Controls functions: reviewed and provided technical analysis of T&M's 100% design specifications & provided technical support and analysis of T&M's Secondary Digester schedule (Update #13). Assisted with the review of the designer's 60% Liquids submission (Front Ends). Discussions with the City & assistance with the various Draw Schedules Options (thru 12/31/13 billings). Coordination with project team regarding contract administration, including: Task Order support including updating of the PM/CM Tasks Costs spreadsheet, and Monthly Report preparation.

WWTP Design Oversight – 30% Limited Review thru 60% Design

- Conducted a technical review of RKK's 60% liquids design package
- Prepared for and attended design meetings. Coordination with RKK, City, and PM/CM Team.

Primary Digester Rehab Design Support (H&S: also see invoice)

- Technical review of T&M 100% design documents.
- Reviewed and commented on T&M's schedule and its relations to the WWTP improvements project schedule.

Force Main 42" Construction Management Services (Weston: also see invoice):

- On-site inspection services and associated project management.
- Review and management of Shop Drawings, RFIs, construction schedule updates, and pay application.
- Client and project team discussions and meetings related to the Force Main construction project.
- Project controls, budgeting, planning, and progress reporting.
- Laboratory subcontractor services

City of Reading
June 2014
Wastewater Treatment Plant Upgrades
PM/CM Monthly Progress Report
Hill/Weston/Hazen and Sawyer

Executive Summary:
The Project Management/Construction Management (PM/CM) team continued work on Consent Decree related tasks as well as other supporting Wastewater Treatment Plant (WWTP) tasks. Critical work items for June included: continued design oversight work (review of 30% Solids, 60% Liquids design submittals) for the WWTP upgrades and secondary digesters rehabilitation projects (bid phase), construction management services for the force main project (project closeout), and ongoing project management/controls tasks integrating the effort.

Anticipated work for July includes: continued design oversight work (review of 60% Liquids) for the WWTP upgrades and secondary digesters rehabilitation projects (bid phase), construction management services for the force main project (project closeout), and ongoing project management/controls tasks integrating the effort.

A more detailed task breakdown of the June work effort is included in the respective PM/CM's subcontractor invoices/reports.

Project Management (Hill: also see invoice):

- Project Management: maintained working copies of the Construction and Draw Schedules.
- WWTP (design): Reviewed the designers 60% specifications (Division 01, Liquids bid package) and submitted comments to the project team on 6/5. Coordinated the 30% Solids bid package w/ sub-consultant (Hazen & Sawyer). Review/research documents on designers ftp site.
- Force Main (42"): coordinated w/ sub-consultant (Weston) & assisted with construction-closeout related issues (e.g. punch list, final pay application/retainage).
- Secondary Digester Rehabilitation: Reviewed designer's 100% Front End Documents (Division 00) and submit comments to project team on 6/2; bid phase coordination w/ City regarding Addendum #1. Reviewed designer memo & schedule (Update #14), prepared comments, and submitted PM Analysis/Recommendations to the project team on 6/29.
- 6CPS Act 2: review sub-consultant report regarding chronology of reimbursable costs to City.
- Financial: review Bond Draw correspondence from City's financial consultant and issued comments to the project team on 6/11.
- PM Administration functions: project team coordination/integration including action item review, correspondence, and deliverables status. Updated project action items, Agenda, and participated in client meetings—WWTP update, PLA, future PM/CM tasks review--on 6/20. Contract management, including

invoice/monthly report preparation, reconciliation of billings to sub consultants, and maintenance of the PM/CM Tasks/Budget worksheet (adjustments to contract budget; track base work and task orders progress and budgets).

Project Controls (Hill: also see invoice):

- Performed required Project Controls functions: Assisted with the review of the designer's 60% Liquids submission (Front Ends). Participated in the Secondary Digesters Pre-bid meeting, Coordination with project team regarding contract administration, including: Task Order support including updating of the PM/CM Tasks Costs spreadsheet, and Monthly Report preparation.

WWTP Design Oversight – 30% Limited Review thru 60% Design

- Conducted a technical review of RKK's 60% liquids design package
- Conducted a technical review of RKK's 30% revised solids design
- Prepared for and attended design meetings. Coordination with RKK, City, and PM/CM Team.

Primary Digester Rehab Design Support (H&S: also see invoice)

- Final review of T&M 100% design/bid documents.
- Reviewed and commented on T&M's schedule and its relations to the WWTP improvements project schedule.

Force Main 42" Construction Management Services (Weston: also see invoice):

- On-site inspection services and associated project management.
- Review and management of Shop Drawings, RFIs, construction schedule updates, and pay application.
- Client and project team discussions and meetings related to the Force Main construction project.
- Project closeout functions
- Project controls, budgeting, planning, and progress reporting.

Act 2 Consulting & Support Services for 6&CPS (Weston: also see invoice):

- Compile a summary for the City of the correspondence relating to the evolution of the cost assessments between UGI/Stantec and Weston for the environmental investigations and activities.

Hazen & Sawyer
City of Reading Collection Systems Engineering Support

This Progress Report covers the period from April 1, 2014 through June 30, 2014 for engineering services related to the City of Reading Collection System Support.

Primary efforts during this time period included the following activities:

Task 1 - Hydraulic Modeling and Capacity Evaluation

- Continued capacity evaluation of the City's interceptors including the connection points from contributing municipalities.
- Pump Station flow information was received from the City of Reading at various times throughout the reporting period.
- Further calibration for wet weather was completed with 2013/2014 flow data.
- Meetings, teleconferences and coordination with the City occurred throughout the reporting period.

Task 4 – I/I Evaluation

- All flow and perception data was received for evaluation and inclusion this quarter.
- Evaluation of data from various sources were used to complete the I/I evaluation. The City's subbasins were prioritized for further investigation including CCTV.

Task 6 – Condition Assessment and System Investigation

- Proposals for On-call services for CCTV and Manhole inspections were received in April, evaluated and awards made.
- CCTV of Priority 1 sewers began and was substantially completed this quarter with oversight by the Hazen and Sawyer Team. By June 30, 2014, 1285 pipe segments were attempted for a total of 220,691 lineal feet of sanitary sewer inspected.
- Initiation of additional CCTV inspections of approximately 1500 additional segments listed in Priority 2 subbasins was authorized this quarter. Results from these inspections will be made part of the rehabilitation plan.

CITY OF READING, PENNSYLVANIA

PUBLIC WORKS
503 N. 6TH SSTREET
READING, PA 19601
(610) 655-6236

RALPH E. JOHNSON
PUBLIC WORKS DIRECTOR

October 28, 2014

Certified Mail
Return Receipt Requested

Ms. Margaret L. Hutchinson, Esq.
Assistant United States Attorney
Civil Division Eastern District of Pennsylvania
615 Chestnut Street
Suite 1250
Philadelphia, PA 19106-4476

Re: City of Reading Consent Decree
Calendar Quarterly Progress Report
3rd Quarter 2014

Dear Ms. Hutchinson:

In accordance with Section VI Reporting Requirements, Paragraph 41, you will find enclosed the City of Reading's Calendar Quarterly Report. This report documents progress and status on the implementation of Section V Remedial Measures described in Paragraphs 7 through 40. Please feel free to contact me at 610-655-6236 should you have any comments or questions.

Sincerely,

Ralph E. Johnson

Ralph E. Johnson, PE
Public Works Director

RJ/ts
Enclosure
C: Christopher A. Day, Esq., US EPA
Lisa Trakis, US EPA
Gary Hepford, PA DEP
Shawn Arbaugh, PA DEP
Carole Snyder, Managing Director
Deborah A.S. Hoag, P.E., Utilities Systems Manager
Anthony C. Vesay, P.E., Hill International
Keith Mooney, Esq., Legal Counsel
John J. Miravich, Esq., Fox Rothschild
file

City of Reading Consent Decree
Calendar Quarterly Progress Report
Period Ending September, 2014

V. REMEDIAL MEASURES

A. General Duties

7. Duty to Comply with Permit – The City's wastewater treatment plant (WWTP) was in compliance with the NPDES permit parameters.

8. Operation and Maintenance of the Facility – No change. The operation and maintenance ongoing program is implemented.

B. Interim Measures

9. Interim Compliance – Environmental Management System

(b) Maintenance Management System – No change. The WWTP computerized maintenance management system (CMMS) ongoing program is implemented.

(c) Supervisory Control and Data Acquisition (SCADA) System

1. Upgrades to the Interim SCADA System – No change. The WWTP SCADA system ongoing program is implemented and is periodically updated as appropriate.

2. Upgrades to the SCADA System – No change. This measure will be addressed under the Wastewater Treatment Plant upgrade.

(d) Pretreatment Data Management System – Continuing progress. The City continues the use of a commercial pretreatment database as well as an abbreviated spreadsheet for simplicity and verification.

10. Interim Plant Influent Monitoring – No change. The plant influent monitoring ongoing program is implemented.

11. Interim Trickling Filter Performance Measures

(a) Performance Improvements – No change. The trickling filter performance measures ongoing program is implemented.

12. Process Control Testing – No change. The process control testing ongoing program is implemented.

13. Dangerous Gas Detection – No change. The gas detection ongoing program is implemented.

14. Certified Plant Operators – No change. The ongoing 24/7 qualified supervisor coverage is implemented.

15. Operations and Maintenance Plan – No change. The operations and maintenance plan remains in place and is annually reviewed and updated as appropriate.

16. Staffing Plan – No change. The ongoing 24/7 supervisor coverage is implemented. The ongoing communication process is implemented.

17. Interim Wet Weather Operational Strategy – No change. Please see the wet weather operation plan.

C. Long Term Evaluation and Construction Schedule – In addition to the Wastewater Treatment Plant this remedial measure reporting includes activities associated with pump stations, force mains and Act 537 planning.

The 42" flow-meter replacement project is complete.

The 42" force main project is complete. The existing river crossing has been lined as a backup pipe in compliance with a previous PaDEP requirement. The remaining items on the contractor's punchlist (removal of silt fencing, replacement of guardrail, repair of automatic gate, and signed and sealed information from the valve manufacturer for the operating shaft/shear pin design) have been completed, as have any general closeout activities.

The baseline schedule for the Sixth and Canal Pump Station Phase I design services was submitted by T&M August 4th, 2014 and approved on September 2nd. A kickoff/study review meeting was conducted on August 4th. The 30% design submission was completed and delivered on September 19th.

Weston Solutions continues to work on the 6&CPS ground and groundwater contamination issue.

The RFQ for the Sixth and Canal Pump Station Phase II design services was completed by Hazen and Sawyer and advertised for potential bidders.

The Anaerobic Digester Rehabilitation project at the Wastewater Treatment Plant is continuing on schedule. The design has been completed and the bids for the construction of the improvements were received on July 9, 2014. The construction is composed of three contracts – General, Electrical and HVAC. The general and hvac contracts were awarded to Eastern Environmental Contractors, Inc. The electrical contract was award to PSI, Inc. Mobilization was completed during the week of September 29th.

The Improvements to the Fritz Island WWTP project design by Rummel, Klepper & Kahl, LLP (RK&K) of York, PA is progressing. In order to maintain schedule, the project has been split into two components – liquid treatment facilities upgrade and solids treatment facilities upgrade. The liquid facilities design has progressed and 90% design documents were delivered August 19th 2014. The solids facilities 60% design documents were delivered on September 2nd, 2014. The PADEP WQM Part II permit application was submitted on June 30, 2014. The DRBC permit application was submitted and is listed on the DRBC's June 2014 Notice of Applications Received (NAR). A meeting with PADEP was held on April 28, 2014 at which time the changes to the project were presented. We will determine if another PADEP 537 plan update and consent decree paragraph 18 and 19 updates are required. The City and RKK believe we will be able to

make up the time delay and still maintain the project bid schedule. The City is pursuing PennVEST funding and bonds for this project.

The City has issued a Request for Proposals Phase I: Statement of Qualifications for Construction Management for Consent Decree Projects and, separately, for Program Management for Consent Decree Projects. The City desires to separate the two functions that are currently contained under one contract and to enhance the PM services by incorporating higher level program management coupled with coaching and guiding of City staff so that they can perform the lower level tasks. Bids were received August 29th and are currently being evaluated.

18. **Treatment Plant Alternatives Submission**
    - **(a) Existing Plant Process Evaluation Report** – No change.
    - **(b) Evaluation of Treatment Alternatives Report** – As stated above there are additional revisions to the WWTP design being considered. If required, an additional update to the Evaluation of Treatment Alternatives will be submitted along with an updated 537 Planning Special Study.
19. **Capital Improvements Plan** – No change at this time.
20. **Request for Proposals** – No report.
21. **Permit Applications and Design** –The WWTP Upgrade project's PADEP WQM Part II Permit application was submitted to PADEP on June 30, 2014. The WWTP Upgrade project's DRBC permit application was submitted and is listed on the DRBC's June 2014 Notice of Applications Received (NAR). The Secondary Digester Rehabilitation project's DRBC permit application was approved on June 11, 2014.
22. **Permitting** – No report.
23. **Construction Completion** – No report.
24. **Start-Up and Operation** – No report.

D. Collection System

25. **GIS Mapping System -** In progress. See below.
    - **(a) Purpose of GIS System** - Not applicable.
    - **(b) GIS Mapping of the Sanitary Sewer Collection System** – Certified and continuing. The City transmitted a certification for the functionality of the GIS on June 28, 2013. The City continues working to improve the accuracy of the information and ensuring the information is tracked as changes are made to the collection system impacting the GIS. The City has been using CCTV and magnetic locating as well as cross-referencing between design plans, GIS, and aerial imagery to investigate and resolve inconsistencies to update the database. Discussions have and will continue to include the continual updating and long-term maintenance of the database.
    - **(c) GIS Mapping of the Storm Water Collection System** – Certified and continuing. The City transmitted a certification for the functionality of the GIS on June 28, 2013. The City continues improving the accuracy

of the information and ensuring the information is kept current as changes are made to the collection system that impacts the GIS.

26. Sanitary Sewer System Evaluation Program

(a) I/I Analysis by Subsystem

The City continued investigating and updating the mapping required for the coordination of the collection system investigative, modeling, and rehabilitative work.

Hazen & Sawyer continued evaluating the data from various sources to complete the evaluation of the inflow and infiltration into the City's system by subareas.

1. Baseline Flow and Rainfall – In Progress. Flow metering was conducted in 2005 and temporary flow meters were placed in the system again in December 2013. Data collection began mid-December with the flow meters and rain gauges in the system through almost the end of March. All flow and precipitation data were received by Hazen & Sawyer during the second quarter of 2014 for evaluation and inclusion.

2. Hydraulic Modeling – In Progress. City Council awarded a contract with Hazen & Sawyer for an enhanced scope of services to include this and other collection system engineering support on October 14, 2013. The hydraulic model was developed and a dry weather calibration was performed using the 2005 flow data. Further calibration for wet weather was completed with the new flow, weather, and pump station data.

(b) Sewer System Evaluation Survey – In Progress. The sanitary manhole numbering system is refined continually as field work shows additional or missing manholes and will continue to do so. Hazen & Sawyer has refined subareas with the newer GIS data used as the base. The computerized maintenance management system implementation project progressed to go live with full-scale geospatially-oriented tracking of preventive and corrective maintenance as well as repairs. The City and Woolpert worked together on software configuration for service requests, work orders, and projects to track personnel, equipment, materials, and contractors. The asset relationship for certain activities is being reviewed where there is not a City asset to associate with the work. Options for tracking this work in the CMMS are being evaluated with other users and integrators being contacted.

After soliciting and evaluating proposals, the City awarded a contract to Woolpert to inspect and evaluate the sanitary sewer intermunicipal connection points and flow meters. Woolpert performed field investigation and observations at the points as determined through the Act 537 planning and intermunicipal agreement mapping processes.

The connection point locations mapped by SSM Group were distributed for municipal review to be finalized with the municipalities prior to the connection point and flow meter report being finalized. Additional changes were incorporated based upon review and comment. A combined

report including the SSM connection point mapping and Woolpert evaluation was sent to each municipality for review and comment. Several municipalities sent comments for review by the City and consultants and will be transmitted to the other impacted municipalities prior to finalizing the reports. Some municipalities signed a certification statement on the accuracy of the information as presented.
On April 11, 2014, the City received proposals for Closed Circuit Television (CCTV) and Manhole (MH) Inspection On-Call Service Contracts, and City Council awarded to all four proposers at their April 14th meeting. CCTV inspection work in specific subareas is currently assigned to RedZone Robotics. By August 30th, RedZone CCTV'd 1377 pipe segments for as total of 247,443 lineal feet of sanitary sewer inspected in Phase 1 and 1385 pipe segments for total of 250,662 lineal feet inspected in Phase 2 per invoices submitted. The NASSCO PACP-coded data is being reviewed and evaluated by Hazen and Sawyer (H&S) for the SSES and Rehabilitation Plan. Data and database issues have been encountered on the initial August 30th submission as well as additional subsequent ones. As of this writing, a complete PACP-compliant database has NOT been received for use in developing the SSES as required. The City has placed RedZone on notice for breach of contract for the failure to perform and continues to work to obtain a compliant database.
The City finalized a contract with Mr. Rehab for manhole inspections in the Phase 1 and 2 areas as determined from the flow monitoring. With the assistance of H&S, the pilot inspection data was reviewed to be MACP compliant.

27. Rehabilitation Plan – No progress. *The SSES is required to be complete in order to develop the Rehabilitation Plan.*

28. Rehabilitation of Priority Areas of Collection System – No progress. *The rehabilitation plan is the precursor of this.*

29. Wet Weather Operation Plan – Completed.

E. Pretreatment Program

30. General Duty – In progress. The City has an approved pretreatment program and continues to regulate industrial users in the collection system.

31. Enforcement Response Plan (ERP) Implementation – In progress. The City continues to follow the ERP in order to encourage compliance from all industrial dischargers.

32. ERP - Penalty Escalation and Compliance Schedule – In progress and continuing. The City continues escalating penalties for all industries that are in significant non-compliance for a given parameter for two consecutive quarters. As penalty escalation had not been detailed in the ERP, the City has documented the process and amounts for consistency and as a reference tool.

33. ERP – Order, Permit Revocation, and Federal Referral – In progress. The City continues escalating the enforcement actions focusing on the financial penalties assessed to permittees who remain in significant non-compliance. The City continues to confer with US EPA while attempting to have industries achieve

compliance. One industry has been problematic for an extended time following completion of a recent compliance agreement. US EPA requested additional information from the industry and has been speaking with the City regarding this permittee's recent compliance. The City met with an industry representative in 2012 to discuss recent compliance and plans for long-term attainment. The industry installed an automated skimming system they believe will address their non-compliance for oil and grease. In 2013, another phase of pretreatment was constructed with space allocated for further pretreatment if necessary. Since the system has been on-line, their compliance has improved to sporadic violations with decreasing frequency and inconsistent noncompliance instead of SNC. The City continues to closely monitor this industry for compliance.

34. Local Limit Adoption by Contributing Municipalities – In progress. All the municipalities with permitted industries have adopted the ordinance. Electronic versions of the City's sewer use ordinance had been provided to each municipality, engineer, and/or solicitor to prepare for adoption. This requirement is detailed in the revised intermunicipal agreement being reviewed and executed by the contributing municipalities. This is reiterated in the annual request for information to complete the requisite annual system operations report.

35. Non-Residential Connection Evaluation and Investigation – In progress. The City has been working with the contributing municipalities to obtain this information periodically to summarize, survey, and evaluate nonresidential users in the service area that may need to be permitted. A standardized method for routine reporting will be developed in cooperation with the municipalities under the new intermunicipal agreement.

36. Increased Monitoring for Violators – In progress and continuing. The City continues to increase City sampling and encourage increased voluntary self-monitoring for industries with violations. In general, permits may be amended or re-issued requiring multiple resamples for parameters with prior compliance issues. Some permits require increased frequency of monitoring for multiple quarters of compliance prior to returning to a less frequent self-monitoring schedule. Additional monitoring by both the City and the industry is tracked and reported annually. The merits of increased self-monitoring are routinely discussed as industries are encouraged to do so to avoid SNC and publication.

37. Pretreatment Computerized Management System - In progress and continuing. The City continues data entry into a commercial pretreatment database as well as an abbreviated spreadsheet upon receipt of analytical results from both City and industrial sampling.

38. Local Limits Re-Evaluation – Completed. Evaluation submitted to US DoJ and US EPA on May 5, 2006. Comments were received from US EPA and the City initially worked with B&V to address the comments and concerns. The City's renewed NPDES permit, effective December, 2013, includes requirements for local limits re-evaluation. The local limits sampling plan for the collection system was developed with some locations being modified slightly to be more representative of the system as a whole and to reflect new service area additions. The City formally documented the sampling locations for a local limits site sampling plan focusing on the collection system locations and incorporated the

industries as well. The treatment plant sampling plan locations were used as discussed previously, and the sampling and analysis has been completed. Simultaneously, the City developed and issued an RFP for local limits development and pretreatment support. Due to some personnel issues, the RFP issuance was delayed and proposals will not be received until October 30th.

39. Quarterly SNC Reports to US EPA – In progress. With all the reports submitted for the first quarter, we were pleased that no SIUs were in SNC. For the second quarter, there were six SIUs in SNC of which only two were directly due to the sampling. The others were due to failures to report or resample. The City monitors penalty payment status and will continue to investigate errors in the penalty payment and posting as reported to the US EPA. The City continues working interdepartmentally to resolve and ensure accurate tracking and reporting in all systems. We will continue to work to resolve this issue as specific entries and adjustments have been identified. There continue to be industries that are not current with their payment, but they are decreasing in number on the specific pretreatment report and overall when doing the investigative reviews. The City has been making follow-up calls to those who are delinquent to prompt payment.

F. Funding

40. Funding – In progress. As was presented previously, the City has separated the City Retail Sewer Fund from the Sewer Fund that addresses the entire system. This accounting change allows the City to keep storm water expenses separate from sanitary sewer expenses and ensure the City is paying appropriately into the Sewer Fund for the City's retail customers per the new intermunicipal agreements. The formal separation was approved by City Council with the actual accounts being created as necessary. The 2015 budget was presented to City Council with the new fund separation and the budgeted transfer amount from the Sewer Fund to the General Fund remaining at $3,000,000. In order to stabilize finances, this transfer will be taken periodically throughout the year.

VI. REPORTING REQUIREMENTS

41. Report Contents and Certification

(a) Remedial Measures Paragraphs 7 through 40 – See above numbered sections.

(b) Anticipated Problems – See italics in above numbered sections.

(c) Additional Matters – See italics in above unnumbered sections.

(d) Certification Statement –

I certify under penalty of law that this information was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my directions and my inquiry of the person(s) who manage the system, or the person(s) directly responsible for gathering the information, the information submitted, is to the best of my knowledge and belief, true, accurate, and complete.

Ralph E. Johnson

Public Works Director

10/31/14

Date

City of Reading
July 2014
Wastewater Treatment Plant Upgrades
PM/CM Monthly Progress Report
Hill/Weston/Hazen and Sawyer

Executive Summary:
The Project Management/Construction Management (PM/CM) team continued work on Consent Decree related tasks as well as other supporting Wastewater Treatment Plant (WWTP) tasks. Critical work items for July included: continued design oversight work (review of 30% Solids design submittals) for the WWTP upgrades and secondary digesters rehabilitation projects (bid phase), construction management services for the force main project (project closeout), and ongoing project management/controls tasks integrating the effort.

Anticipated work for August includes: continued design oversight work (review of 90% Liquids) for the WWTP upgrades and secondary digesters rehabilitation projects (bid phase), construction management services for the force main project (project closeout), construction management of the secondary digesters project (project kickoff), and ongoing project management/controls tasks integrating the effort.

A more detailed task breakdown of the July work effort is included in the respective PM/CM's subcontractor invoices/reports.

Project Management (Hill: also see invoice):

- Project Management: maintained working copies of the Construction and Draw Schedules.
- WWTP (design): Resubmitted 60% specifications (Division 01, Liquids bid package) to RKK. Review and discuss several versions of RKK Schedule Update 1.
- Force Main (42"): coordinated w/ sub-consultant (Weston) & assisted with construction-closeout related issues (e.g. punch list, final pay application/retainage).
- Secondary Digester Rehabilitation: Reviewed designer memo & schedule (Update #14), prepared comments, and submitted PM Analysis/Recommendations to the project team on 6/29.
- 6CPS Act 2: review sub-consultant final report regarding chronology of reimbursable costs to City.
- PM Administration functions: project team coordination/integration including action item review, correspondence, and deliverables status. Updated project action items and formatted into Program Action Item Tracker, Agenda, and participated in client meetings – WWTP Update on July 25, 2014. Contract management, including invoice/monthly report preparation, reconciliation of billings to sub consultants, and maintenance of the PM/CM Tasks/Budget worksheet (adjustments to contract budget; track base work and task orders progress and budgets).

Project Controls (Hill: also see invoice):

- Performed required Project Controls functions: Assisted with the review of the designer's 60% Liquids cost estimate, Coordinate with the City regarding 6CPS and Secondary Digester tasks, Develop a concise Program Action Item list and review with the City, Review the 6CPS baseline schedule submission, Review T&M and RKK schedule updates, Coordination with project team regarding contract administration, including: Task Order support including updating of the PM/CM Tasks Costs spreadsheet, and Monthly Report preparation.

WWTP Design Oversight – 30% Limited Review thru 60% Design

- Conducted a technical review of RKK's 30% revised solids design
- Prepared for and attended design meetings.
- Coordination with RKK, City, and PM/CM Team.

Primary Digester Rehab Design Support (H&S: also see invoice)

- Reviewed and commented on T&M's schedule and its relations to the WWTP improvements project schedule.
- Coordination with T&M, City, and PM/CM Team

Force Main 42" Construction Management Services (Weston: also see invoice):

- Conducted project closeout activities.
- Client and project team discussions and meetings related to the Force Main construction project.
- Project controls, budgeting, planning, and progress reporting.

Act 2 Consulting Services at 6CPS (Weston: also see invoice):

- Revise and resubmit Final version of the cost assessment memo
- Compile a summary for the City of the correspondence relating to the evolution of the cost assessments between UGI/Stantec and Weston for the environmental investigations and activities.

City of Reading
August 2014
Wastewater Treatment Plant Upgrades
PM/CM Monthly Progress Report
Hill/Weston/Hazen and Sawyer

Executive Summary:
The Project Management/Construction Management (PM/CM) team continued work on Consent Decree related tasks as well as other supporting Wastewater Treatment Plant (WWTP) tasks. Critical work items for August included: continued design oversight work (review of 90% Liquids design submittals, Second Opinion Peer Review) for the WWTP upgrades, design oversight services for the 6CPS Phase I project, development of an RFQ for the 6CPS Phase II designer procurement, construction management services for the force main project (project closeout), and ongoing project management/controls tasks integrating the effort.

Anticipated work for September includes: continued design oversight work (finalize review of 90% Liquids, 60% Solids) for the WWTP upgrades and 6CPS Phase I project, construction management of the secondary digesters project (project kickoff), and ongoing project management/controls tasks integrating the effort.

A more detailed task breakdown of the August work effort is included in the respective PM/CM's subcontractor invoices/reports.

Project Management (Hill: also see invoice):

- Project Management: maintained working copies of the Construction and Draw Schedules.
- WWTP (design): Review and discuss several versions of RKK Schedule Update 1. Discussions related to SOPR and 90% Liquids Review.
- PM Administration functions: project team coordination/integration including action item review, correspondence, and deliverables status. Updated project action items and formatted into Program Action Item Tracker, Agenda, and prepared for client meetings. Contract management, including invoice/monthly report preparation, reconciliation of billings to sub consultants, and maintenance of the PM/CM Tasks/Budget worksheet (adjustments to contract budget; track base work and task orders progress and budgets).

Project Controls (Hill: also see invoice):

- Performed required Project Controls functions: Conduct calls with the City and Update the Program Action Item list, Review the 6CPS baseline schedule submission, Review T&M and RKK schedule updates, Coordination with project team regarding contract administration, including: Task Order support including updating of the PM/CM Tasks Costs spreadsheet, and Monthly Report preparation.

WWTP Design Oversight – 60% thru 100% (H&S: also see invoice)

- Conducted a technical review of RKK's 90% liquids design
- Prepared for and attended design meetings
- Coordination with RKK, City, and PM/CM Team

Act 537 Special Study (H&S: also see invoice)

- Per City direction, completed a technical review of RKK's Second Opinion Review document and provided comments
- Coordination with T&M, City, and PM/CM Team

Force Main 42" Construction Management Services (Weston: also see invoice):

- Conducted project closeout activities.

6CPS Phase I Design Oversight (H&S: also see invoice):

- Reviewed and commented on T&M's Short Term Improvements Study
- Coordination with City and PM/CM Team

6CPS Phase II Designer RFQ/RFP (H&S: also see invoice):

- Developed and submitted a draft RFQ to the City for review
- Coordination with City and PM/CM Team

City of Reading
September 2014
Wastewater Treatment Plant Upgrades
PM/CM Monthly Progress Report
Hill/Weston/Hazen and Sawyer

Executive Summary:

The Project Management/Construction Management (PM/CM) team continued work on Consent Decree related tasks as well as other supporting Wastewater Treatment Plant (WWTP) tasks. Critical work items for September included: continued design oversight work (review of 60% Solids design submittals, Second Opinion Peer Review) for the WWTP upgrades, finalizing an RFQ for the 6CPS Phase II designer procurement, construction management services for the force main project (project closeout), construction management services for the secondary digesters (project kickoff) and ongoing project management/controls tasks integrating the effort.

Anticipated work for October includes: continued design oversight work (review of RKK responses to the 90% Liquids comments, review of the 90% Solids design) for the WWTP upgrades and 6CPS Phase I project, construction management of the secondary digesters project, and ongoing project management/controls tasks integrating the effort.

A more detailed task breakdown of the September work effort is included in the respective PM/CM's subcontractor invoices/reports.

Project Management (Hill: also see invoice):

- WWTP (design): Review and comment on RKK's red belly turtle mitigation plan, UV option from the SOPR.
- PM Administration functions: Project team coordination/integration including action item review, correspondence, and deliverables status. Updated project action items and formatted into Program Action Item Tracker, Agenda, and prepared for client meetings. Contract management, including invoice/monthly report preparation, reconciliation of billings to sub consultants, and maintenance of the PM/CM Tasks/Budget worksheet (adjustments to contract budget; track base work and task orders progress and budgets).

Project Controls (Hill: also see invoice):

- Performed required Project Controls functions: Review of RKK 90% Liquids Div. 00 and 01 specifications, Conduct calls with the City and Update the Program Action Item list, issue 60% Liquids Cost Estimate comments, Discussions with City regarding SOPR and Red belly turtle mitigation plan, Review the 6CPS schedule submission, Coordination with project team regarding contract administration, including: Task Order support including updating of the PM/CM Tasks Costs spreadsheet, and Monthly Report preparation.

WWTP Design Oversight – 60% thru 100% (H&S: also see invoice)

- Conducted a technical review of RKK's 60% solids design
- Prepared for and attended design meetings
- Coordination with RKK, City, and PM/CM Team

Act 537 Special Study (H&S: also see invoice)

- Per City direction, completed a technical review of RKK's Second Opinion Review document and later revisions and provided comments
- Coordination with T&M, City, and PM/CM Team

Force Main 42" Construction Management Services (Weston: also see invoice):

- Conducted project closeout activities including site inspection with PADEP and review of PACT as-built files.

Force Main 42" Supplemental Permitting Studies (Weston: also see invoice):

- Reviewed and commented on RKK's submitted red belly turtle mitigation plan

6CPS Phase II Designer RFQ/RFP (H&S: also see invoice):

- Finalized RFQ and distributed to the City
- Coordination with City and PM/CM Team

Secondary Digesters CM Services (Hill):

- Begun development of submittal log
- Set up specific project control systems

ENGINEER'S MEMORANDUM OF PROJECT STATUS
ANAEROBIC DIGESTER REHABILITATION PROJECT
CITY OF READING
October 1, 2014
Prepared by T&M Associates, Inc.

1. **Project Schedule:** Reference is made to the electronic project schedule, 18th update of the baseline, submitted to the City of Reading and Hill International along with this report on 10/1/14 (dated 9/30 /14). Comments from Hill on last month's schedule are summarized as follows:

"Continue to coordinate with RK&K, so plant operations (MOPO) are maintained, the plant meets permit, any design-related conflicts are resolved, and site logistics are coordinated. Reevaluate the completion of Activity #132 – Solids Contract Notice of Award – for the WWTP; assign a predecessor activity."
T&M has been coordinating with RK&K and the City throughout the design process regarding the overall facility upgrade project, and we are continuing close coordination as we move into construction. A construction coordination meeting(s) may be necessary with RK&K (not presently within T&M's scope of services). T&M will confirm the completion date of Activity #132 upon RK&K 60% design completion and obtain a predecessor activity from RK&K.
"Perform contracted, construction related services – review shop drawings, answer RFIs, process pay application, assist/coordinate with the digesters' construction inspector, etc. – throughout this phase."
T&M will perform the above duties per the contract with the City.
2. **Completed Tasks – Project Schedule Update:** As of 9/30/14, all "Bid Phase Services" have been completed. Under "Construction Engineering Services", T&M completed item No. 114 (Review Executed Contract Documents) and No. 115 (Pre-construction Meeting and Minutes). Task No. 116 "Shop Drawing Review" is in progress.

3. **Project Update:**
a) The City solicitor issued a Notice of Intent to Award to Eastern Environmental for the HVAC contract on 8/28/14.
b) Shop drawing review is in progress. The submittal for the long lead time equipment item, the Linear Motion Mixer, was received and reviewed. T&M is awaiting receipt of the other long lead time equipment item shop drawing - heater/heat exchanger.
c) T&M was notified by the City on 9/24/14 that the draining of Digester No. 4 ceased on or around 9/10/14. The final sludge level was measured at 12.25 feet from bottom manway to top of sludge blanket.

4. **Current Schedule Status**:
a) T&M will continue shop drawing review.
b) Hill has required the general contractor attend a scheduling conference on 10/3/14 to discuss shortcomings with Eastern's preliminary construction schedule, specifically, linkages with successors and predecessors.

5. **Project Schedule Immediate Milestones (October):**
a) The General Contractor schedule indicates mobilization the week of September 15. Mobilization has been delayed until the week of September 29.

6. **Action Item on Schedule Immediate Milestones:**

The General Contractor must demonstrate compliance with the contract periods given the delayed mobilization date. This will be discussed at the construction scheduling meeting on 10/3/14.
END OF REPORT

Hazen & Sawyer
City of Reading Collection Systems Engineering Support

This Progress Report covers the period from July 1, 2014 through September 30, 2014 for engineering services related to the City of Reading Collection System Support.

Primary efforts during this time period included the following activities:

Task 1 - Hydraulic Modeling and Capacity Evaluation

- Continued capacity evaluation of the City's interceptors including the connection point's from contributing municipalities.
- Pump Station flow information were received from the City of Reading at various time throughout the reporting period.
- Further calibration for wet weather was completed with 2013/2014 flow data.
- Meetings, teleconferences and coordination with the City occurred throughout the reporting period.

Task 5 – Capacity Analysis and Assurance

- Capacity analysis under current and future conditions continued during this quarter.

Task 6 – Condition Assessment and System Investigation

- CCTV of Priority 1 sewers was substantially completed by this reporting period.
- Redzone Robotics, Inc. has submitted invoices to the City for 247,443 linear feet of sewers for Phase 1 and 250,662 linear feet of sewers for Phase II.
- Review and evaluation of CCTV data continued during this quarter.
- H&S received the first submittal in July for Phase I. Upon review of the data by H&S, it was found that the data included errors, including, but not limited to, incorrect and inconsistent pipe and manhole identifications, incomplete and inconsistent reporting of directional flows, and incomplete and inconsistent inspections.
- Since then, H&S and the City have been contacting Redzone so that Redzone can correct these discrepancies. Redzone subsequently has submitted three times to date inspection databases. Redzone has reassured the City that it is working to rectify the problem. However, each of Redzone's submittals has had issues with the quality of the data.
- As of September 30, Redzone had not submitted a complete cleaned up inspections database.
- In the first week of October, H&S, the City and Redzone had a conference call regarding the discrepancies in Redzone's data. It was agreed upon that Redzone would submit corrected data by October 15, 2014.
- Redzone subsequently submitted the data on October 21, 2014. However, it was not the complete data set but a partial database and again included errors.
- The City's attorney has sent a breach of contract letter to Redzone on October 24, 2014.

Task 7 – Sanitary Sewer Evaluation Survey

- H&S has started evaluating the data but due to the errors with Redzone's data, we have not been able to embark on the evaluations.

Task 8 – Manhole Inspection and Evaluation

- Assisted the City in negotiating a contract for manhole inspections.

Task 13 – Technical Standards, Specifications and Construction Details

- Created standard details and specifications to support work associated with rehabilitation projects.